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AMERICAN JOURNAL OF PUBLIC HEALTH

CONTINUING THE

JOURNAL OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

VOL. II—OLD SERIES VOL. VIII
1912

NEW YORK, N. Y.
AMERICAN PUBLIC HEALTH ASSOCIATION

SOCIAL WORK
PER
V. 2
1912
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VOL. II JANUARY, 1912 No. 1

AMERICAN JOURNAL OF PUBLIC HEALTH

THE PRESIDENT'S ADDRESS*

Robert M. Simpson, M. D.

Winnipeg.

To the Members of the American Public Health Association,

Ladies and Gentlemen: In opening this, the Thirty-eighth Congress of the American Public Health Association, I wish first to convey to you my deep appreciation of the favor done me, when at your last meeting I was chosen to be your President. In view of the continental character of this body, the great work it has done, and the still greater work before it, I do not wish to be regarded as speaking lightly, when I say that I consider this to be the greatest honor of my life. Nevertheless, I confess to be rather acutely conscious of my shortcomings and can turn for comfort only to the reflection that I have tried, and will try, to the best of my ability, to fulfil the duties connected with the office.

Apart altogether from their specific objects, international associations such as ours are very potent for good, and I think that with the great and ever increasing tide of kindliness and good will, that flows back and forth across our artificial dividing lines, they are in no small degree to be credited. I wish I were capable of expressing to the citizens of Havana and Cuba the feelings I entertain towards them for the welcome they have given us. In the North we are accustomed to associate all that is pleasant with the South. It is the South wind that tempers our rugged climate, that brings the soft rain and the birds and the flowers. When we speak there of Southern hospitality, we mean *that* from the heart, which is truest and best, and I can assure you that after the reception which we have received here we will return to our homes with this idea still more firmly impressed upon our minds.

One thing that has cheered me throughout the year has been the thought that the place of meeting was to be in your beautiful city, on its sea-girt island. To us of Saxon blood, the Spanish Main has always been a veritable fairyland of romance. Its very name brings to our minds some of the most picturesque figures in history, and innumerable deeds of high emprise, derring-do, and heroic sacrifice. A great writer has said that "Happy is the country whose annals are uninteresting." I would rather say that "Happy is the land that has been tried as with fire, and has emerged, like you, triumphant, confident, and girt as a strong man to run a race." I hope that never again in your fair land will be heard the sound of the war-drum or the marching of armed hostiles. I hope that you will go on to your destiny as a great, happy, prosperous, peace-loving nation, something of which your sunny skies, your fertile soil, and the character of your population seems to give such fair assurance.

---

* Read before the American Public Health Association, Havana, Cuba, 1911.

It is here my sad duty to refer to the toll which the Grim Reaper has exacted from our Association during the past year. Since the last meeting, has fallen General Walter Wyman, who was our Dean. A man endowed with the natural qualities which make for greatness in any walk of life. Of immense energy and unusual foresight, courteous, dignified and scholarly, he was a type of which any nation might well be proud; and in his native land, in the great works inspired by him and carried out under his direction he has a monument more lasting than brass.

Gone also from us is another, Ex-President Dr. Bailey; a man kindly, forceful, strong in counsel, and one whom we always looked forward with pleasure to meeting at our annual gatherings.

May it be given to all of us to be called as these men were, from the very van of the fight, after full and useful lives spent largely in the service of our fellowmen.

"Unarm, Eros!
The long day's task is done
And we must sleep."

It is also with great regret that I speak of the resignation of Dr. Probst, as Secretary of the State Board of Health of Ohio, and of his absence from this meeting. His efficiency and personal qualities have won for him the respect and affection of every member, and after his long and faithful service we had come to regard him as a very integral part of our Association. There is, however, a grain of comfort in this: that, if I am not misinformed, he intends after a well earned rest to devote his energies largely to anti-tuberculosis work.

In beginning the more matter-of-fact part of my address, I feel that much of what I have to say may seem to you very trite. Most of it has been said before by better men and in a better way. Still, I believe that there is often much value in reiteration. Permanent progress in public health matters or in other fields is not accomplished as a rule by sudden advances or leaps, but it is by the slow hammer, hammer, hammer process that results are generally achieved.

The prime object of this Association is, I take it, to secure for our different countries the greatest possible amount of health and happiness, through the application of scientific methods for the prevention of disease. We meet here to interchange ideas, to learn what is new, to winnow out by discussion and counsel what is true from what is false, the wheat from the chaff. The ultimate purpose of our meeting is, however, not attained until on our return home such knowledge is put into actual practice. For its successful application it is absolutely essential to have the sympathy and active co-operation of the people whom we wish to serve. To obtain this it is obviously necessary that the people should know and that the people should believe.

I therefore maintain that one of the most important functions of this Association is the matter of popular education in health matters. I am convinced that in the past the work of this body has been to a certain extent rendered abortive, or its results delayed, by a lack of some tolerably direct and expeditious way of communicating the same to the public. For my own part, I favor the oral method, *i. e.*, lectures, demonstrations with the use of the dark lantern, slides, and exhibits—and I think it the duty of the members of this Association to endeavor to have such instruction in public health matters made a sort of extension work of every board of health, medical college, university, and technical school in the whole land.

If one wishes to appreciate fully what can be accomplished by such work, he has but to reflect on the results of the vigorous campaign against tuberculosis inaugurated a few years ago all over America. In going about my home city I note every day, with gratification, very tangible evidences of this work—sidewalks free from expectoration, prohibitory and hortatory notices, house after house provided with out-door sleeping compartments. In my connection with our Board of Health I have been impressed also with the increased ease with which it is possible to procure legislation on matters such as the regulation of buildings, as to ground space, ventilation, and light, and how much easier it is to enforce such legislation, by virtue of the people realizing the importance of living under proper hygienic conditions.

For some time I have felt that our Journal is not altogether what the official organ of this Association should be and that its usefulness might be greatly enhanced. The fault is not with the present management, who have done excellent work, but with ourselves, who have expected them to make bricks without straw. It should, I hold, be so manned and financially supported that it may be not only practically a record of the proceedings of this Association, but also a sort of clearing house for information concerning all matters pertaining to public health. There is no reason that I can see why it cannot be made a journal of such inherent merit that it will be a necessary part of the armamentarium of every practical hygienist.

It is an odd thing, often commented on, that men as a rule are most careless about what is really their best possession, their health. In fact they generally do not fully appreciate its value until it is seriously endangered. The same thing is in a large degree true of States. If we were considering the matter from an abstract point of view, without experience, we would almost certainly conclude that the care of the public health, with its resulting preservation and prolongation of life, would be one of the chief concerns of governments. But this is indeed far from being the case, as you all know, and it sometime appears as if the health of the people were of less importance in the eyes of our lawmakers than that of our domestic animals.

To my mind, the time has come when there should be in each of our respective countries a Federal Department of Public Health, with a minister of full cabinet rank, or at least a permanent medical head as Deputy Minister or Under Secretary. The benefits that would accrue from the establishment of such departments are many, and obvious to you all, and not least among these are the increased directness and force with which matters concerning public health would be presented to legislatures. There are many problems connected with such things as the pollution of streams, pure food laws, quarantine, and so forth, which can be satisfactorily dealt with only by some such central authority, and I am sure its assistance and cooperation would be welcomed by all provincial and state boards of health.

I am glad to be able to inform this Association that a Commission on Conservation, with Dr. Hodgetts as Medical Adviser, has been formed in Canada since our last meeting in Milwaukee, and I have no doubt this Commission, acting in conjunction with the other public health boards, will render valuable aid in promoting the interests of public health, both inter-provincial as well as international.

There are many things that I would like to speak of at length, to some of these I cannot refer at all, the others I must perforce deal with, at best, in a very cursory manner. I do not believe in long presidential addresses, but would rather say one thing that would make even a slight impression on you than many things that you would forthwith proceed to forget.

I am impelled by a sense of duty rather reluctantly to speak at a meeting of this kind of certain social diseases that have been heretofore allowed to work their grim havoc in darkness and practically unopposed. If only those who sinned suffered, one might regard the situation with more complacency; but the wide and terrible involvement of the innocent and defenseless makes the present condition of affairs seem to me almost unbearable. A committee, I am glad to say, has been appointed to deliberate on the matter, a most difficult and delicate task, and from its personnel I am confident that their conclusions will be wise and will receive your hearty endorsement. I would charge them, however, that this hideous nettle must be grasped firmly, and that no mawkish sentiment or false notions of personal rights should be allowed to influence them in their decisions.

I am sure that we have all welcomed the new light that has recently been thrown on that dread disease of childhood, infantile paralysis. In the past we were accustomed to sit, practically with folded hands, baffled and dismayed by its erratic and thief-like mode of attack. Now, however, we may take fresh heart, for with our new knowledge the value of a rigid quarantine is established, and there is indicated the disinfection, in persons exposed to the disease, of those mucous surfaces which seem to furnish the favorite route of infection.

So also after the work of last year, no one, I think, will have the hardihood to question the value of anti-typhoid vaccination. The results recently obtained in the American army and navy are surely sufficient to destroy any preexisting doubt on this subject. Its use for some time will likely be confined more or less to organized bodies, but I confidently look forward to its ultimate wide adoption by the medical profession, as an efficient preventive measure.

The report of the Royal Commission on Tuberculosis of England, is now to hand, and while it but confirms what has been long accepted by nearly all laboratory workers its effect on the general profession and people will be good. Besides going a good way to settle a much vexed question, it will strengthen our hands in the laudable but very formidable undertaking of freeing our domestic cattle of this disease. I also note with satisfaction a recent order of the Local

Government Board of England on compulsory notification of tuberculosis. This, I think you will agree, is an important step in the right direction, and I sincerely hope it will be followed by all government and state boards of health through our countries.

The successful manner in which up to the present those dread diseases, cholera and plague, have been repelled from our shores reflects the greatest credit on those departments which have to do with our quarantine service. When we consider the present geographical distribution of these diseases and the ever increasing international traffic, it must be admittted a most remarkable achievement. It is indeed on this, the first line of our defense, that our hopes are chiefly based, for I am sure that there are few of you, if any, but regard as something appalling the possible entrenchment of the plague bacillus among the rodents of this continent.

The Association may well be proud of its work since its organization in 1872. Its activities have broadened year by year, and I believe the future has in store even greater possibilities. The Laboratory Section, formed in 1901, has performed most valuable work, the most important being in connection with a standard method of water analysis and milk and air examination. To the Vital Statistics Section great credit is due for promulgating an international classification of diseases, which has been adopted in many parts of the world. The Municipal Health Officers' Section, dealing with the practical means for health administration in centres of population, has, in a most decided manner, proven its worth and must be admitted one of the most useful of all our sections.

One of the most recent daughters of our Association, and of exceeding promise, is the Section of Sanitary Engineering. Its potential value will be most appreciated by those of us who come from rapidly developing districts, where towns of four or five hundred inhabitants spring up in a few months and where all sorts of novel conditions affecting water supply and sewage disposal are encountered. I would personally like to see it a sort of tribunal where we could bring our difficulties and problems for solution and where we might obtain expert direction and advice.

The inauguration also at this meeting of a Section of Sociology is of peculiar interest to me, perhaps from a natural bent or perhaps because I am not fitted by my training to appreciate to the same degree the work of some of the others. To my mind we are called on to consider no matter of equal importance with that of the proper housing of the poor in our different cities. Its direct and wide relation to the health and morality of a community is so patent that, I am sure, a vigorous and concerted campaign on our part would easily produce results of inestimable value. Among a host of other questions, that of the regulation of child and female labor seems to demand attention. In short, I think, that this section is to be congratulated in having a field that is practically illimitable, abounding in all sorts of knotty but alluring problems the solution of any one of which means the increase of happiness and the amelioration of suffering. I wish it Godspeed and confidently look forward to great and concrete benefits as a result of its deliberations for I can but regard it as a reproach to this Association that even at the present time in many of our cities slum areas are in process of formation.

During the last few years the thing that has bulked more largely in the eye of the sanitary world than any other is the work of Colonel Gorgas on the Panama Canal Zone. The attention which it has attracted is no doubt due in part to its connection with an undertaking of great magnitude and of international importance but far more largely to its own striking merit and the results attained. So vivid indeed has been the contrast between the conditions which prevailed during the French regime and those which now obtain that it has evoked almost universal wonder and applause. No one thing that I know of has ever brought home as convincingly to the world at large the value of preventive medicine even from a cold economic point of view. Never again will armies go into the field with medical services ridiculously hampered and equipped, or large public works be undertaken without the workmen being provided with efficient sanitary protection.

Less spectacular but still very instructive is what has been done on the extension work of the New York water supply. There it has been proven possible to have a huge body of men, most of them ignorant laborers, living in scattered camps on the water-shed supplying a large city, and apparently with perfect safety to the community served. In a situation fraught with all sorts of dire possibilities, the vigilant and intelligent application of a few simple measures has sufficed to prevent pollution on this immense water-supply.

It would not be fitting if I omitted from my address a reference to the monumental arbeit of Finlay and Lazear, Carroll, Reed, and Agramonte, which has resulted in the banishment from your fair island of a dread disease and which largely made the achievements of Col. Gorgas possible. The story of that work will never die, and I predict that as time goes on the memory of it will become one of your proudest possessions. It is truly inspiring to think that in this age, which we are so accustomed to regard as mercenary and huckaback, men of such truly heroic mould can rise. How much greater they than those who seek the bubble reputation at the cannon's mouth. Surely the day is not far distant when the names of such will be inscribed as high on the roll of fame as those of great captains and statesmen.

In conclusion, I wish to thank you from my heart for your attention tonight and to assure you that I already feel strengthened and cheered by a sense of your kindly sympathy. I hope that this Association will soon again visit my native land, where, if we cannot provide the peerless attractions of this, the Pearl of the Antilles, we will at least try to have you come away believing that the cold in clime are not always cold in blood.

PRESENT VIEWS OF THE IMPORTANCE OF MUNICIPAL SANITARY INSPECTION FOR THE ABATEMENT OF NUISANCES.*

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Every competent health officer of today bases the chief work of his department upon the fundamental conception that, so far as our present knowledge goes, every contagious disease is dependent for its spread upon the transfer of tangible material from a specifically infected person to the next victim. He further knows that this infectious material is given off from the affected individual in the body secretions and excretions, except in that group of diseases in which some insect carrier acts as an intermediary host.

The value of any policy directed against the spread of contagious diseases must therefore be measured (both as to its intrinsic merits and as to its sucessful prosecution) by its success in limiting this transfer of infectious material from person to person. Attention to those things which are calculated to increase the bodily resistance of the individuals of a community (thereby lessening their chances of contracting contagion even though exposed to its virus) is destined eventually to become an equally important policy in our health departments of the future.

No matter how fully the health officer himself appreciates the principles just laid down, he is forced to diminish his usefulness to his community by reason of the number of side issues which claim so considerable a part of his time and thought, either because of their being officially placed under his department or because of popular demand for what he knows to be misdirection of those facilities which he has at his command and which he could, if unmolested, employ with more beneficial results.

It thus becomes the plain duty of health officers, as a body, to determine the actual and relative importance of the activities commonly assigned to municipal health departments, and, individually, to use their efforts in their respective communities to eliminate the useless or less useful, to build up the more useful, and to employ along the lines of greatest public benefit those facilities placed at their disposal.

Just what is the importance of municipal sanitary inspections as a part of the general campaign against disease in any community? Before answering this question I wish to call attention to the fact that, as stated in the title, I will confine my discussion of this question to a consideration of the importance of inspections for the correction of insanitary conditions, or, to use a more common expression, for the "abatement of nuisances."

Among the many vexatious things with which every health officer has to contend, no one thing so tries his patience as does the misunderstanding of the general public as to the real work of a modern department of health. It is safe to say that the vast majority of the citizens in any community know absolutely nothing of the real work in which their health officer, if he is doing his duty, is engaged—the scientific studies of a general and local character which he conducts; the correlation of the work of all his subordinates and the interpretation of results; the outlining of new policies and the successful execution of those for which he is fortunate enough to secure the necessary support; the decisions as to how his meager appropriations had best be employed; the meeting of threatened dangers before they have become a real menace; the daily work for limiting all preventable diseases; the discipline of his department; the educational efforts which he must make; the keeping in constant touch with the leaders in his profession, as through the work which he should do in this Association and in local organizations of a similar character; the constant attention which he must give to keeping his work before the public in such a way as to help his community; the co-operation which he must aim always to secure from leading citizens and their business organizations; the inevitable controversies which arise from selfish interests and in which he must successfully maintain his points against all attacks—these are a few of the matters, set down almost at random, which engage the best thought of a real health officer.

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* Read before the American Public Health Association—Section of Municipal Health Officers, at the thirty-ninth annual meeting of the Association, Havana, Cuba, December, 1911.

Knowing nothing of these things, the general public still believes that the main duty of the health officer is to remove dead dogs and cats, stop sewer outlets from smelling, remove garbage, grade and pave alleys, stop leaking roofs, and a hundred things of this kind, and that, moreover, he should in every case give to complaints of "citizens and taxpayers" in connection with such matters his own immediate and personal attention, or that, at any rate, he should in person listen to their complaints concerning them, and then at least dispatch a special officer at once with directions to report back to him in detail, in order that he may personally have the difficulty corrected.

Realizing, therefore, on the one hand, the fundamental facts in the epidemiology of contagious diseases mentioned in the first part of this paper, and, on the other hand, being forced to neglect important matters for things of little moment, 'and, incidently, having their lives made miserable in connection therewith, it is little wonder that there has been a growing sentiment among health officers to rid their departments of a thing which appeared to do so little good, and which, at the same time, constituted the chief cause of loss of valuable time and of a thousand petty annoyances.

I recall a meeting of a prominent public health body at which I was present in the fall of 1902. The leading paper at this meeting was read by one of the most prominent health authorities in this country. In it he took the bold stand that the abatement of common nuisances had no connection whatsoever with public health, and he argued that health officers should be bold enough to announce this fact and rid themselves of a source of annoyance and of a line of work which tended only to create misconception on the part of the public as to the real work of public health authorities today. His position was heartily endorsed by every subsequent speaker except one, and this one advanced no argument which would appeal to us at the present time.

I think it may safely be said that many of our best health officers have been saved from following the advice just mentioned, representing, as it did, the views then held by many prominent sanitary authorities, chiefly because they dreaded public disapproval of a course involving what the public itself demanded. In other instances sanitary inspectors have been retained because the political situation in most cities makes it even more difficult to abolish positions once created than it is to get additional ones established. Whatever may be the cause, it is certainly most fortunate that no general movement on the part of sanitarians has been made towards abandonment of a service which, once regarded with prime favor, fell temporarily into disrepute, but which, as it is the aim of this paper to show, is now coming to its own again.

We do not find among municipal health officers today unanimity as to the importance of abating nuisances. They are still divided into two camps. Those who claim that the abatement of nuisances constitutes one of the most important functions of a municipal department of health are themselves divided into two very distinct groups—on the one hand, the old fogies who have not advanced beyond Murchison's pythogenic theory of disease, and, on the other hand, the men who have never held that theory but who, correlating the mass of facts which have been accumulating within the past few years, have come to see clearly that there is a most important relation between disease and those things which sanitary inspection, as we understand it today, aims to correct. Those who regard sanitary inspection as of little importance from a public health standpoint are far in advance of the old fogies with their fifty-year-old theories, but they lag several years behind those who have read aright the lessons of the past few years and are putting them in practice.

What is responsible for the increased respect with which sanitarians are coming to look upon the intelligent abatement of nuisances and upon sanitary inspection as the means by which it is to be attained? I believe the main points are as follows:

1. The enormous importance of human excrement as a cause of disease. The existence of carriers and unrecognized cases of disease has brought us to realize that *all* human excrement in any community must be properly disposed of, since in no other way can *all dangerous* fecal matter be certainly and invariably looked after in such manner as to insure its harmlessness.

2. Recognition of the fact that a great excess of ordinary filth on any premises very frequently means the presence also of scattered human filth.

3. When is was shown that the multiplication of bacteria of human diseases outside of the animal body occurred only under exceptional conditions (such as typhoid bacilli in milk), the importance of ordinary filth was minimized. We now realize that, even though actual increase in numbers does not occur, bacteria may find in ordinary filth, and under general insanitary conditions, an environment favorable for their prolonged existence—darkness, moisture, favorable temperature (especially where there is moderate heat developed from decomposition), and freedom from disturbance. If, in addition to these, there is present a considerable amount of organic matter, it is by no means safe to state that good, even though not ideal, culture conditions are never present for their actual proliferation.

4 An understanding of the rôle of insect carriers of disease—both the common carriers, such as the house fly, and the specific carriers, such as the mosquito—and our knowledge as to the breeding places of these insects.

5. The ability of the germs of some human diseases (notably the bacillus of bubonic plague) to multiply in the bodies of other warm-blooded animals, and the relation which insanitary conditions may have to the prevalence of these animal pests.

The list of city nuisances which have an important rôle in the spread of disease, in view of the above general facts, becomes at once a long one. The insanitary privy comes easily first, after which follow indiscriminate defecation in alleys, vacant lots, etc. (by children and other irresponsible persons); wells on premises with bad privies near at hand; wells with bad tops; all wells in sections where a good public water supply is available; standing water on streets, alleys and lots; house stables, city dumps, and all collections of organic refuse. These are but a few of the things which may, from one or more of the above considerations, be real factors in spreading disease.

For the detection of these and other important nuisances, a sanitary force educated to recognize nuisances which constitute real sources of danger is an absolute essential in any modern municipal department of health. Needless to say, the force should be of sufficient size to provide for systematic inspections covering the entire city at such intervals as may be found desirable in the special community. Some sections, of course, demand more frequent inspections than others.

The investigation of complaints which are made to the office is but a small part of the work. As a rule these do not come from those sections of the city in which conditions are actually worse, and the conditions complained of are not usually of real significance. Yet to neglect those complaints which appear to be unimportant and to have no bearing on public health would be a grave error. True, we now believe that bad odors cause no disease, but investigation of a complaint of this kind may lead to the discovery of a larva-infested manure heap or a dilapidated and dangerous privy.

For some time after I became connected with the Richmond Health Department, a very large number of complaints came in regularly in regard to long weeds on vacant lots in the better sections of the city. This, it seemed to me, could not possibly concern the public health, and time after time I explained to the complainants that they had no cause to fear the noxious emanations which led to their complaints, as weeds differed in no respect from trees, grass and flowering plants, and I asked them if they had ever been made ill by these things when they went to the country. I declined to make the department absurd by ordering the owners of these lots to have the weeds cut.

So persistent were the complaints, however, that I thought I would look into the matter personally. I may remark here that the health officer who will go around and see things for himself will frequently get a different idea of then from what he gains by hearing about them. I went to inspect one of these patches of weeds. They had evidently furnished a desirable retreat, and among them I found several piles of human feces. From each of these a swarm of flies arose as I passed by, and many of them sought safety by flying into the kitchen and dining room windows of the houses on each side. What surety was there that the feces which they had just left had not been deposited by some typhoid carrier?

In this patch of long weeds I found also a large number of old tin cans, evidently thrown out from adjoining kitchens. At least one-fourth of these had landed with the open side uppermost. A rain had come along, and nine of the cans contained water swarming with hundreds of mosquito larvae. Since this experience, I no longer regard complaints concerning long weeds as a silly matter, in no way connected with public health.

As illustrating the importance of human excrement in a city only partially sewered, I may cite the fact that the chief general measure of the Richmond Health Department which I regard as responsible for the lowering of our typhoid fever death rate to less than one-third of what it averaged before the present organization went into effect, and to less than one-half of the lowest rate ever before recorded in our city, is the work done in connection with the privies—of which there were some 3,000 in 1909. Our other special work of throwing every safeguard around each individual case of recognized typhoid fever has been of great value beyond all question, but the great drop in our death rate from this disease came after systematic inspection had been made of these privies and every one of them either rebuilt or repaired in the early part of 1909. It is needless to show that this work would have been impossible without efficient sanitary inspectors.

Dr. Terry has secured similar results in Jacksonville, and he attributes them to the same lines of work. I recall that when he first visited me in Richmond, shortly after his appointment as City Health Officer of Jacksonville, and told me that his first act had been to get his sanitary force increased from twelve to fifteen men, I feared for an instant that he was of the old school, but I soon saw that, with its climate taken into consideration, fifteen sanitary inspectors were none too many, even for a city of 65,000 inhabitants.

And this brings me to an exceedingly important point. Nearly all really scientific public health work in the United States up to a very few years ago was done by northern men. Their conclusions were naturally accepted as applying to the entire country. In the last five years, however, there has been an immense development along public health lines in the South, and many excellent sanitarians are now to be found in this section of the country.

For many years it seems never to have occurred to our northern friends in the public health field that their magnificent work might not be of general application, in every detail, to all parts of the country. In consequence of this they have been inclined to regard as heretical the doctrines expounded by men in the South who have actually done scientific work of very great value. We sat at the feet of northern sanitary scientists for many years, and the debt of gratitude which we owe them is indeed an immense one, and one which we cheerfully and gratefully acknowledge. But we ask now to be allowed to repay some part of that debt by sharing with them the results of our own work, secured by methods of scientific investigation which we learned largely from them. I have gone into this last question because it has a most decided application to the subject of the present paper. My plea for recognition of the importance of sanitary inspections applies with special force to cities in warmer climates. The extent to which they are applicable in any given community must be determined by the health officer himself, after careful consideration of the question.

I have given five reasons why sanitary inspection is coming again to be recognized as one of the most important of the activities of a municipal department of health. If we consider these reasons with this special point in view, it is easy to see that they are most applicable to cities in warm climates.

1 and 2. While human excrement is everywhere an important cause of disease, *local* spread of infection from this source is far less to be considered in the North than in the South. Northern cities as a rule are better sewered than those in the South. The necessity for shelter during the winter months would naturally make premises without a privy of some sort more rare, and the same reason would lead to the construction of a tighter building, and to its maintenance in better condition. In connection with hookworm infection (not a municipal problem to any extent), even if the organism itself were capable of flourishing in colder climates, the practice of going barefoot is naturally less common and extends over fewer months in the year.

3. For a large part of the year at least, conditions for the survival of the bacteria of human diseases outside of the animal body would seem to be less favorable in the North than in the South. The hypothetical occasional proliferation of such organisms outside of the animal body would certainly be less favored.

4. Favorable climatic conditions for the breeding of the house fly exist for a shorter period in the North. Even during this favorable period the temperature is not so high, thus lengthening the cycle of each generation, and hence lessening the number of generations in a season. Since flies increase in geometrical progression, these factors should profoundly affect their numbers. Moreover, for the reasons given under 1, 2 and 3, there should be far less dangerous material for flies to distribute.

While mosquitoes are notoriously prevalent in some remarkably cold climates, their season is much shorter and Anopheles and Stegomyia (Aëdes) gradually disappear as we advance north. The absence of initial cases of malaria and yellow fever would make these genera of mosquitoes harmless even though present.

5. While there may be other diseases than bubonic plague in which lower animals play an important rôle, this is certainly the chief one now known. Up to the present time, public health policies directed against the rat have not been seriously considered in the eastern part of the United States, either North or South.

From a point of view entirely different from that heretofore taken up in this paper, we are able to claim increased consideration for sanitary inspection and also to get a suggestion of its special importance in warm climates. It is little short of incredible that sanitarians have been so slow in applying to their own communities, in the warm temperate zone at least, the principles which stand out in the marvelous accomplishments of sanitation in tropical and subtropical communities.

That the Canal Zone has been transformed from a pestilential region into one comparable with the United States in healthfulness has served as a text for every writer and lecturer on sanitation for several years. Yet we seem slow to see here a suggestion that this victory, won almost solely along the line of sanitary inspection of the modern type, has a lesson for us all. Similarly, the great results obtained in Havana and New Orleans seem to have been accepted by municipal health officers as classic instances of notable achievements in sanitary science rather than as examples of what we ourselves should be doing; and as fine material for our boasts from the platform rather than as an irresistible incentive to work along similar lines—modified, of course, to suit our own respective communities—and thereby secure for them, not the conquest of impending disaster of colossal proportions but a large measure of relief from constant needless sacrifice of human life, which in the aggregate far exceeds every year any loss of life which even the most fatal epidemic of yellow fever itself has ever occasioned.

In closing I desire to make it very clear that in this paper I have endeavored to deal only with the value of sanitary inspections having for their object the control of nuisances, but with an insistence that our conception of what constitutes a nuisance has greatly changed in the past few years.

There is a much broader field which I have made no attempt to discuss, because of the limitation of time and also because I wished to bring to the attention of this body a single, specific and much-misunderstood subject without detracting therefrom by any attempt to go into any sidetracks, no matter how alluring. Closely correlated with the subject which I have presented for your consideration is that of expansion of inspection service along other lines. The whole question of housing and living conditions, both in the home and in the school, workshop and store, must eventually receive far more attention than it has heretofore claimed in even the most advanced communities. There is not the slightest doubt but that such a disease as consumption, for example, can never be controlled until organized effort of all the agencies making for civic betterment is directed against this fundamental phase of the problem. Such work will not only limit still further the spread of infectious disease—that group of diseases which we now call preventable—but it will also have a most profound influence on a multitude of human ills, in which poverty, overwork, dangerous occupations, overcrowding, underfeeding, bad ventilation, alcoholism, dissipation and exposure are factors of paramount consideration.

Eventually, therefore, we will have sanitary inspections of a different character from those above discussed, working along the line of building up the resistance of the individuals in the community rather than against the dissemination of material of infection. With these two kinds of sanitary inspections in perfect working order, I believe that our science will gain triumphs which have been only dimly foreshadowed by any of the victories thus far placed to its credit.

EXTERMINATION OF THE HOUSE FLY IN CITIES, ITS NECESSITY AND POSSIBILITY*

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It is not my purpose to touch upon the anatomy or life history of the House Fly nor to dwell upon his peculiar adaptation to the dissemination of certain kinds of infectious material. This ground has been so thoroughly covered by recent investigators as to require neither additional facts nor comment in a paper of this nature.

That some sanitarians of repute claim that the fly has been "over-worked" as a carrier of intestinal diseases, I am aware, but I prefer to attribute their attitude to the local conditions that have been the scenes of their labors and to a disregard of conditions elsewhere rather than to a desire to discredit researches as complete as those published during the past decade dealing with this subject.

The part played by the fly as a disease carrier in any given community, and hence the necessity or not for his extermination, must be determined in each individual case. Everyone will admit that in certain cities the fly plays a far less important rôle as a disease carrier than in others. The typhoid cases due to fly carriage will, in a completely sewered city, be far less in number than in one where a large proportion of the population is without adequate means for sewage disposal.

In the North and East the fly is probably much less a menace to the public health than in the South, for two reasons: the longer fly season in the southern states and the elementary means of sewage disposal in most of our cities. Each case must be determined upon its own merits. This may be done, I believe, by the determination of two conditions:

First, the amount of infectious material remaining for a longer or shorter period accessible to flies.

Second, the comparative prevalence of this insect.

Where human excrement lies unprotected to any appreciable degree I believe that active measures against the fly will bear fruit in the reduction of morbidity and mortality from certain causes. The habits of this insect are too well known for us to doubt that but two conditions are necessary to render him a menace to the public health; exposed infectious material and exposed food supplies. Admitting this, it becomes necessary to determine to just what degree these conditions co-exist in any given community. It is unnecessary to argue that where they do exist the fly will be found in sufficient numbers to render him a distinct menace.

So far as our present knowledge extends, the diseases most commonly carried by flies in this country are those commonly known as intestinal diseases; typhoid fever, dysentery, summer complaint, etc. Where, then, excretions from individuals suffering from any of these maladies may lie exposed to the free access of flies it would seem that definite measures were necessary to prevent this exposure.

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* Read before the Section of Municipal Health Officers, American Public Health Association, Havana, Cuba, December, 1911.

In Jacksonville there are in round numbers 8,500 surface closets. Allowing three persons to a family, this gives us over 25,000 individuals, or 41 per cent. of the total population, inadequately provided with means for sewage disposal. This surface-closet district is not confined to any one portion of the city but is distributed about evenly throughout every suburb and even the older sections. In fact there is no point within the city limits of Jacksonville further than nine blocks from one or the other of the dry closet districts, while 75 per cent. of the population live within three or four blocks of dry closets, notwithstanding the fact that their own premises may have sewer connections.

It would appear then that conditions in Jacksonville are peculiarly suited to fly transmission of disease, being in fact little better than those of an army camp. This assumption has been borne out for the past decade by the undue prevalence of intestinal diseases during the summer months. I regret to say that accurate figures of typhoid prevalence are not available prior to 1910, when this disease was first made reportable.

Judging, however, from the mortality records, its greatest prevalence has always been during the summer season. For 1910 our case records are pretty complete. They show a total of 329 cases reported to the Health Office. Charted by months, the curve of this disease followed very closely that of the fly as determined by observations on the prevalence of this insect about the stables and city dumps. Furthermore, the distribution of the disease as regards the sewer and dry-closet districts shows for that year 60 per cent. among those supplied with dry-closets as against 40 per cent. for the sewer district, although this latter district comprises 59 per cent. of the population.

It appeared that we had made a pretty strong case against the fly, and in August, 1910, we succeeded in passing an ordinance requiring all dry-closets to be rendered fly-proof. This ordinance was modeled after the one devised by Dr. Levy, which had secured for him such marked results in Richmond.

The enforcement of this ordinance was begun energetically, and by the first of April of the present year (which marks the beginning of our fly season) between eighty and ninety per cent. of all dry closets had been reconstructed according to its requirements. At the present writing (November) probably ninety-five per cent. of these places are in good order.

Together with the rendering fly-proof of the privies, the Department has required that the sick room, in every case of typhoid, be screened and the flies destroyed by means of poisons or sticky fly paper. This routine has been carried out by detailing an inspector to visit each case every other day from the time of its reporting until convalescence is established. Where the financial condition of the family renders the screening of the sick room a hardship, mosquito netting, sticky fly paper and disinfectants have been furnished by this Department and their use strictly enforced and watched. Printed instructions supplement verbal ones in each case.

As the result, we believe, of this campaign against the fly the number of cases of typhoid reported to this office up to the first of the present month (November) was 142 as against 321 for the same period in 1910, this notwithstanding the fact that the reports of cases for the present year are more complete than those of last year. Not only has there been a reduction of 56 per cent. over last year's reported cases, but we find that the distribution of these cases as regards sewer or non-sewer districts shows no disproportion in favor of the latter as did the cases of 1910. They are distributed proportionate to the population regardless of sewage disposal.

It would appear, in spite of the lack of strictly scientific proof, that this reconstruction of the privies so as to prevent the access of flies to the excrement has had a very direct bearing upon the reduction of the typhoid cases during the current year. The reduction as far as the State is concerned applies only to Jacksonville. Other towns and cities have had their annual share of the disease this year and beyond the city limits in every settlement typhoid has been continually epidemic.

In spite of the statement of Dr. Chapin that, "There is no evidence in the average city that the house fly is a factor of great moment in the dissemination of disease," I believe that, throughout the South at least, this insect plays an important rôle in such dissemination. In making this statement Dr. Chapin probably has in mind the well sewered cities of the North. Jacksonville, like many other southern cities, is not a well-sewered city. Not only, as already stated, do the conditions of an army camp prevail in nearly every district, but I am inclined to believe that, until the passage of the ordinance above referred to, our conditions were worse than those of the average army camp where, at least, the latrines are segregated to a certain section more or less remote from tents. With us there are 8,500 privies impartially distributed throughout the city, each an open, reeking mass of excrement; each within twenty-five or thirty feet of an unscreened kitchen or dining room, and this in a climate where fly-breeding progresses unchecked by temperature for at least nine months in the year.

Could any conditions be found more ideally adapted to fly carriage of infection? The conditions described for Jacksonville are not exceptional in the South, and I believe that throughout this section of the country in almost every town and city south of Washington will be found conditions differing only in degree from those I have described; namely, exposed infectious material, unprotected food supplies and an abundance of flies.

The trinity essential to fly carriage existing, the extermination of the fly appears to offer the only certain alleviation of its dangers. The rapid growth of our cities in the last decade almost precludes the possibility of the sewers keeping pace with the newer sections, and the protection of foods by screening, while permitting the fly to breed unchecked, is as inadequate as it is illogical.

The beginning of this campaign of extermination must in every community start with a thorough inspection and classification of all fly-breeding places. The results of such an inspection carried on during the past summer in Jacksonville will, I believe, prove of interest to those whose activities are spent in other towns and cities of the South.

This inspection covered two of the larger classes of fly-breeding places, stables and public dumps. Since the reconstruction of the privies, I feel that these may be eliminated for the time being as breeding places of importance, though from observations made prior to this reconstruction I realize that they furnished no inconsiderable proportion of our flies.

STABLES.

The objects of this inspection were:—

First: to ascertain the actual number of stables in the city harboring one or more horses or mules.

Second: to determine what part is played by those stables in the breeding of flies.

Third: to discover in what measure the construction and maintenance of stables affects their fly-breeding possibilities.

We found a total of 1,096 occupied stables. Of these 944 had dirt floors, 136 wooden floors and 16 cement or brick floors. Of the dirt-floor stables 113 were inspected in detail, the information sought being the condition of the earth in the stalls (hard, soft, wet or dry), the presence or absence of larvae or pupae in the floors, whether or not manure was piled loosely or kept in a covered container, what other local conditions appeared to favor, or not, the breeding of flies in and about these structures. The following facts were elicited:

Floors containing larvae or pupae, 79.

Floors found to be free from larvae or pupae, 34.

In those floors free from larvae there were chickens scratching in 15. In the remainder free from larvae 19, the stables had just been cleaned, the top soil being replaced with dry sand.

A subsequent inspection, ten days later, of the 19 stables where no larvae were found on the first inspection and where chickens were absent, showed larvae present in 13.

To recapitulate, 94 per cent. of the dirt-floor stables where chickens were absent showed the presence of immense numbers of larvae and pupae. The remainder presumably would have shown them had they not been thoroughly cleaned just prior to the inspection. Between seven and eight per cent. contained no larvae owing to the presence of chickens. This leaves us 817 dirt-floor stables breeding flies throughout the season except for an occasional period of a few days when the top soil of the stalls is entirely removed and replaced by dry sand.

It is interesting to note that in these dirt-floor stalls larvae were invariably found at a depth of from one to three inches below the surface and in the ground which was soft and wet. This observation led the inspector after a little practice to determine the sex of the animal harbored. In the case of a mare the larvae were found posterior to the position occupied by the hind feet; where, on the contrary, a horse occupied the stall the larvae were found around the imprints of the front feet owing to the different distribution of the urine in the two cases.

Outside of this moist center is usually found, in the drier soil, a ring of pupae. In many stalls which appeared at first glance to be clean, inasmuch as the bedding and manure had been swept away, digging to a depth of an inch or two disclosed a host of larvae. In a stall of this description nothing short of complete removal of the surface soil to a depth of four or five inches and replacing with dry sand every few days will, to any extent, affect their fly breeding possibilities.

It is obvious that this is not a common practice, the great infrequency of manure piles about the premises where dirt-floor stables exist as compared with those maintaining wood or cement-floor stables showed conclusively that in most instances the filth is left in the stalls until its accumulation is such as to warrant the hiring of a wagon to carry it off. The condition of these places confirms this assumption.

Of the wood and cement floor stables, fifty-two were inspected in detail with a view of determining the method of drainage, the soundness of the floors, i. e., the possibility of leakage of fly-blown material to the ground beneath and whether or not the foundation was so constructed as to permit the ingress and egress of flies under the floor.

It so happened that no chickens were present in any of the wood-floor stables inspected; hence the results are indicative of conditions regardless of the activity of these fortuitous scavengers. It was found that 95 per cent. of the floors were not properly drained, that 30 per cent. were not sound, that 57 per cent. of the foundations contained openings below the floor level.

Larvae or pupae were discovered on and in the floors in 70 per cent. as against 94 per cent. of the dirt floor stables. In nearly one-half of the cases where larvae or pupae were found, their presence was due to the fact that the floors were not tight and sound, i. e., contained cracks, broken boards, depressions, etc., which escaped the broom or shovel. In the remainder their presence was due to carelessness on the part of the householder.

Of the thirty stables whose foundations contained openings below the floor level, larvae were found in the ground beneath in twelve. This number should probably be much larger, as in over one-half of the stables inspected the construction of the building prevented the determination of this point without precluding the possibility of its existence.

Two factors enter into the breeding of flies in the soil beneath wood-floor stables. If the floor be not tight and sound, it permits particles of fly-blown manure as well as urine to fall upon the ground beneath the stall and we have all the conditions most favorable to the devolpment of the larvae; food, warmth and moisture. Again if the foundation does not exclude the access of flies below the level of the floors, they will enter this space and oviposit in the material they find awaiting them.

Larvae were found in practically all of the manure piles about these stables, but in over one-half of those inspected the manure had been hauled away just prior to the inspection. It is safe to assume that manure piles when present are undoubtedly large factors in this breeding.

From these findings, in spite of the fact that only 5 per cent. of the wood- or cement-floor stables were connected with a sewer, the large number unsound and a still larger number illkept and improperly constructed, the weight of evidence is strongly in favor of the water-tight floor as against the dirt floor.

Conclusions: First, the feature of the average stable in Jacksonville which conduces most to fly breeding is NOT the manure pile but the FLOOR, as, in the large majority of cases, this is comprised of dirt. In the case of wood-floor stables the soil beneath the stalls plays an important part, though in the latter class the manure pile is the most objectionable feature.

Second: If these places are to be eliminated as fly breeders, certain features in their construction must be rigidly enforced:

(a) No dirt floor stables should be permitted under any conditions.

(b) All floors should be water tight (preferably cement) and so constructed as to drain easily to a low point which should connect by means of a trap to the sewer. Where a sewer is not available a cement pit, tightly covered, may be substituted.

(c) The foundations of all wood-floor stables should be without openings below the floor level. If such openings are required for ventilation they should be screened so as to prevent the access of flies. The practice of boring holes in the stalls to permit the drainage of urine to the ground beneath should be absolutely prohibited.

(d) All manure should be removed at intervals not longer than five days, as under suitable conditions flies will hatch in less than a week.

GARBAGE DUMPS.

Excluding privies, the city dump comes next in importance as a fly breeding place in Jacksonville. There are eight or ten of these dumps distributed about the city. Here again the backwardness of the southern cities in the disposition of various waste materials must be taken into consideration. The waste of Jacksonville far exceeds the capacity of the crematory. There are besides, numerous low marshy places, a number of them owned by the city, which it is desirable to reclaim for parks and other public purposes. To such localities is hauled the garbage which the crematory is unable to dispose of. In spite of an ordinance prohibiting the placing of kitchen refuse in the trash barrel, every load brings its proportion of decomposing animal and vegetable matter—from dead dogs and cats to a miscellaneous assortment of fruit rinds, feathers and fish heads. Fermentation takes place quickly, and in every section of these dumps are found the larvae of the house fly during the warmer months.

The Department in charge of garbage collection has tried, upon the solicitation of the Health Department, to minimize the nuisance as far as possible by covering this evil smelling mass with clean sand. In order to determine what depth of sand would be required to prevent the maturing of these larvae, we have conducted some experiments along the line of those recently carried out by Doctors Stiles and Miller, reported in the Public Health report of August 25, 1911.

These experiments have consisted briefly in burying fermenting matter containing fly larvae or eggs at various depths in ordinary soil. For this purpose tubes of four-inch galvanized rain-spouting were used, with eighteen-mesh copper wire cloth fastened over the lower end. The material containing the larvae was introduced on top of this and the tube filled with sand and buried in the ground. Two inches of the upper end remained exposed and the top was covered with copper wire cloth, leaving a chamber in which any flies which might hatch would be confined. Tubes in lengths varying from six to forty-eight inches were used. The larvae, or eggs, were placed in stale bread previously sterilized and saturated with a pure bouillon culture of B. prodigiosus, upon which presumably the larvae would feed before starting on their journey upward. The sand covering the larvae was sterilized.

From all of these tubes adult flies were recovered in periods varying from five to sixteen days, the average for six different tubes being seven days. One tube prepared as described and kept in the laboratory, instead of being buried, in the present month (November), took sixteen days to hatch its first crop of flies owing presumably to the cold weather, the room being without heat at night and the temperature much lower than the outside temperature during August when the bulk of these tests were made.

The flies, when hatched, were treated in two different ways; some were introduced alive into flasks containing sterile bouillon and allowed for an hour or two to deposit their excrement upon the sides of the flask. These were then agitated and the bouillon incubated. Other flies were maserated before being introduced in the flask in order to thoroughly expose the contents of the alimentary canal.

From flies hatched from 14, 26, 36, 41 and 48 inch tubes B. prodigiosus was recovered. It will be noted from the average of seven days that the depth at which the larvae were buried apparently played little part in the length of their development into adult flies, although the shorter tubes hatched a larger number of flies than did the longer ones. How long these flies would continue to distribute in their specks B. prodigiosus, I do not know. Faichnie in 1909 recovered B. typhosus from flies for several days after the latter had emerged from larvae fed on feces containing these organisms. Ficker in 1903 recovered from flies B. typhosus twenty-three days after their infection. In our experiments sixteen days is the longest time that B. prodigiosus appears to have remained in the intestinal tract of the larvae and pupae of the fly from which we subsequently recovered it.

As already stated, 48 inches is the greatest depth from which we recovered flies buried as eggs or larvae. The onset of cool weather has left the work incomplete in many particulars. Dr. Stiles succeeded in recovering them through 72 inches of sterile sand.

In view of these facts it would appear that the six or eight inches of sand customarily used in Jacksonville to cover the garbage dumps would in nowise interfere with the hatching of flies from the decomposing material beneath. In the inspection made of these dumps larvae were found at a depth of eighteen or twenty inches. Presumably they all hatched.

In an active campaign against the house fly in municipalities such immense breeding places as these garbage dumps should most undoubtedly be discontinued. The possibility of distribution by adult flies of micro-organism ingested during their larval stage causes the dump to assume a still more serious aspect from the point of public health when the contents of the average trash barrel are considered. Should not also the trenching of night soil as practiced by no small number of communities be discontinued in view of this faculty of the insect?

It is my belief that a construction and maintenance of horse stables along the lines indicated, the screening, or better still the abolition of privies and discontinuance of garbage dumps will so far control the fly pest as to almost entirely overcome the dangers of disease-dissemination by this insect.

There is another class of breeding places which will continue to furnish a certain number of flies—those occasioned by the chance scattering of decomposing animal and vegetable matter about yards and alleys and by the not-infrequent custom, in the best sewered communities, with a certain class of individuals, mostly ill-cared for children, of depositing their excrement in any locality which affords a convenient concealment at the time the desire for relief comes upon them. Where a large proportion of the population is composed of negroes, as lacking in nicety of habits as in responsibility, this incubation of the house fly will never be eliminated, and in connection with the abolition of the major breeding places, if we are to attain the full reward of our endeavors, we must, I believe, adopt the suggestion of Prof. Hodge, that of trapping the adult fly during the time elapsing between its issuance from the puparium and the establishment of sexual maturity. According to Hewitt and Griffith, the female oviposits from ten to fourteen days after emerging from the puparium. This period is most favorable for her capture. The enormous number of progeny of a single female fly during a breeding season, as estimated by Dr. Howard, seems a strong argument for her destruction early in the year.

We have done some outside trapping in Jacksonville on a small scale with most gratifying results, the type of traps used being those made of wire cloth in the shape of a cylinder upon a metal frame with a cone inside arising from the bottom. They may be obtained from several different manufacturers at a small figure and when baited with syrup or other suitable material, perform most excellent execution. In three days at a back door of a downtown restaurant we captured 9,000 flies, while inside a fish market in a similar period we captured over 10,000. A second exposure of the trap behind the same restaurant resulted in the capture of comparatively few, presumably owing to the local nature of the pest.

I believe, in any community where the habits and dangers of this insect have begun to be appreciated by the laity (through the efforts of civic associations and other organizations interested in the public good), fish and meat markets, restaurants, public stables and such other places as afford especial attraction to the fly, may be induced to install such traps with little persuasion.

That they are practicable, I am convinced, from our own success, although we began late in the season and only ran a small number, and I believe, it would be worth the labor and expense to any municipal health department to encourage such a measure and assist in its execution by emptying and otherwise caring for the traps at stated intervals.

We are still far from the ideal in sanitary construction and engineering and even in a "reasonably clean and well sewered city" the campaign must ever be an active one.

GENERAL CONCLUSIONS.

First, where infectious material, as in open privies, exists in a community with exposed food supplies together with an abundance of flies, active measures against this insect are a public health necessity.

Second, the house fly may be practically eliminated from municipalities by the proper construction of horse stables with especial reference to water tight, well-drained floors and the prompt removal of manure; the rendering fly-proof of surface privies and the abolition of garbage dumps.

Third, the burying of infectious material if fly-blown, at any practical depth will not prevent either the maturing of the contained larvae or the dissemination of infection by the flies hatched therefrom.

Fourth, trapping, especially early in each fly season, is a practical auxiliary measure.

HOW THE CONFEDERATE ARMY WAS VACCINATED

C. W. P. Brock, M. D.,

Chief Surgeon of the Chesapeake and Ohio Railway, and Late Surgeon in the Confederate Army.

In the fall of 1863, during the late war between the States, I was sent for by Surgeon-General S. P. Moore and told that smallpox was assuming alarming proportions in the Confederate Army and that he wished me to secure enough vaccine virus to vaccinate all the soldiers, and this done very speedily. He offered to place at my disposal as many surgeons as I deemed necessary. I asked him how many soldiers were to be vaccinated, and he told me about two hundred and fifty thousand—that is, the entire Confederate Army at that time.

I asked to have Dr. Russell Murdock report to me, which he did at once. I instructed him to start in at the western end of Richmond, and making a house-to-house visitation, to vaccinate all healthy children of healthy parents, while I myself did the same in the eastern end of the city. The children were vaccinated in six places on each arm, thus securing later twelve healthy vaccine crusts. It is of interest to note that in no instance did a mother refuse to have her child vaccinated when told that this was done to stop an epidemic of smallpox among the soldiers.

On the fourteenth day after vaccination, the crusts were collected, being then about to drop off. Not a single untoward case developed among the children. The crusts were wrapped in tin foil and distributed throughout the Army, with directions how to use them. All this was done in six weeks' time. The threatened epidemic was promptly and completely controlled. In no case was any other disease communicated by the vaccine. The takes were much quicker than with bovine virus, and the arms were nothing like as sore. The protection was at least as good.

Even up to the present time I occasionally see some man or woman with six faint scars on each arm, standing as a record of service rendered as an infant to the soldiers of the Confederate Army in 1863.

Discussion.—Dr. Wheeler said that to him the most interesting feature of the situation portrayed by Dr. Brock's paper was the willingness of the people to cooperate with the authorities in their efforts to prevent the spread of disease. Nowadays associations and societies are formed for no other purpose than to thwart such efforts, and no "ism" or fad is so absurd that an organization may not be formed for its support.

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* Read before the American Public Health Association, Havana, Cuba, 1911.

SEASONAL VARIATION IN THE BACTERIAL CONTENT OF OYSTERS

Frederic P. Gorham,

Brown University.

In the course of the investigation of the sanitary condition of the oyster layings in Narragansett Bay and its tributaries by the Rhode Island Shellfish Commission,* it became apparent that analyses of oysters from a certain bed made in the summer did not agree with analyses of oysters from the same bed made in the winter. With the advent of cold weather there seemed to be so great an improvement in the sanitary quality of the oysters that oysters taken from beds in close proximity to the outfalls of large sewers showed in the colder months entire absence of any evidence of contamination, if judged solely by the results of analyses.

The question of the cause of this improvement during the winter at once arose. Did it mean that the bacterial content of the salt water varied with the season to such an extent as to cause this difference, or did it mean that the bacterial content of the oysters themselves varied at different seasons?

An investigation was immediately begun to answer these questions, if possible. The work of the summer of 1910 showed that all of the oysters on beds in the Providence and Warren Rivers and in the upper parts of Narragansett Bay were so badly polluted by sewage that they would be condemned as unfit for food even when judged by the most lenient standards. The analyses of oysters from these beds showed the presence of the colon bacillus in the shell water of every oyster in amounts as small as one one-hundredth of a cubic centimeter and even less. Analyses of the water, both chemical and bacteriological, showed it to be heavily charged with sewage.

In December, 1910, it appeared that oysters from these polluted areas gave on analysis very different results. Indeed it was impossible to find a single laying in any of these localities which would not pass inspection if judged by the analysis alone. The condition of the water however seemed to be unchanged.

In December, 1910, two of these Providence River beds, numbers 8 and 44 on the 1910 map of the Rhode Island Shellfish Commission were selected for the purpose of studying the results of analyses made during the succeeding five months, or until the waters warmed up and assumed their normal summer condition. Similar studies were made of two other beds in the Warren River, numbers 204 and 205, for the purpose of camparison with conditions in the Providence River because the City of Providence began during this period the routine disinfection of its sewage by means of bleaching powder. But as the sewage from the City of Providence was not the only source of pollution in the Providence River, later examinations showed that this disinfection of Providence sewage had very little effect on the total colon content of the waters of the river. Bacterial analyses of the water over these beds were made at the same time that the oysters were examined, and records were made of the temperature and density of the water, conditions of the tides, winds, etc.

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* See Preliminary Report upon the Sanitary Condition of Rhode Island Oyster Beds, by F. P. Gorham, in the Annual Report of the Rhode Island Commissioners of Shell Fisheries made at the January Session of the Legislature, 1911.

Bed number 8 is about one-third of a mile from the main sewer outlet of the City of Providence which discharges an average of 21,000,000 gallons of disinfected sewage per day into a river already heavily polluted. Bed 204, in the Warren River, is nearly opposite the town of Warren which discharges its untreated sewage into the river by several small sewers. Bed number 44, in the Providence River, and bed number 205, in the Warren River, are some distance below any direct sewage contamination, but the results of the analyses made in the summer showed these to be so badly polluted that they would be condemned under the standards adopted by the State of Rhode Island and the United States Pure Food Board.

All analyses were made according to the Standard Methods adopted by the Laboratory Section of the American Public Health Association. The average total count gives the total number of bacteria present in the shell water of the five oysters examined in each lot. The presence of B. coli in the five oysters examined was tested by the bile tube and subsequent isolation and identification of the organism.

Five oysters were examined in each case and the accompanying table shows the number in which B. coli was found in one, one-tenth and one one-hundredth cubic centimeter amounts of the shell water. The score of the several lots of oysters is the numerical method of indicating the results of the colon test as adopted by the Committee on Standard Methods. A perfect score, that is no colon bacilli found, would be zero, while if every oyster of the five showed colon bacilli present in one one-hundredth of a cubic centimeter of the shell water the score would be 500. The standard adopted by the United States Pure Food Board is that all oysters showing a score of 32 or above be condemned. The temperature of the water ranged from —1 degree C. to 15 degrees C., from the low temperatures of the winter to the higher temperatures of the spring.

SEASONAL VARIATION IN THE BACTERIAL CONTENT OF OYSTERS.

Date.	Average Bacterial Total Count of Shell Water of Five Oysters.	Proportion of Five Oysters showing B. coli in			Score.	B. coli present in water in	Temperature of water, C.
		1cc.	0.1cc.	0.01cc.			
	Bed No. 8. Providence River.						
Dec. 20, 1910	1000	3	1	0	4	0.01cc.	—1°
Jan. 14, 1911	750	5	3	1	41		
Jan. 25	80	4	3	0	23	0.01cc.	1°
Jan. 27	23	5	3	0	32		
Feb. 10	130	2	2	0	4	1cc.	0.1°
Feb. 28	140	0	0	0	0	0.0001cc.	1°
Mar. 11	200	5	4	0	41	0.01cc.	1.75°
April 14	275	5	2	0	23	0.01cc.	8.5°
April 28	700	5	5	4	410	0.0001cc.	12.5°
May 12	1700	5	5	5	500	0.0001cc.	15°
	Bed No. 44. Providence River.						
Jan. 7, 1911	425	5	5	1	140		0.25°
Feb. 10	250	4	0	0	4		0°
Feb. 28	240	5	1	0	14		0.5°
March 11	100	5	2	0	23		2°
April 14	210	2	0	0	2		8.5°
April 28	1000	5	5	4	410		11.75°
May 12	1100	5	5	4	410		14.75°

	Bed No. 204. Warren River.						
Jan. 25, 1911	600	5	4	1	50		0°
Feb. 10	140	0	0	0	0	1cc.	0°
Feb. 28	400	0	0	0	0	0.01cc.	0.75°
March 4	750	3†	3†	0†	†		0.75°
March 11	60	1	0	0	1	0.01cc.	3°
March 14	3400	0	0	0	0	0.01cc.	8.75°
April 28	1050	5	5	4	410	0.01cc.	13°
	Bed No. 205. Warren River.						
Dec. 22, 1910	250	3	0	0	3		—1°
Feb. 10, 1911	325	0	0	0	0	1cc.	0°
Feb. 28	450	4	2	0	14	0.01cc.	1°
March 4	600	2	2	1	5		0.75°
March 11	85	2	1	0	3	0.01cc.	2°
April 14	325	1	1	0	2	0.01cc.	8.25°
April 28	4000	5	5	5	500	0.01cc.	11.5°

† Only three oysters used.

The conclusions to be drawn from these observations seem to be somewhat as follows: The number of B. coli in the water of these rivers during the winter apparently does not decrease and this organism is present practically all the time with such variations as we might expect with tidal conditions. More extended series of observations might show that the temperature had some affect on the colon content but this is not apparent from these investigations.

The most interesting and important results are seen in the B. coli content of the shell water of the oyster. During the cold weather the number present varies somewhat as might be expected in the examination of different lots of the same oysters, but is never very high, and in most cases these oysters would pass the standard required by the government and state authorities. But just as soon as the water begins to warm up the number gradually increases, until with the warming of the water to 12 or 15 degrees the number reaches the maximum, and practically every oyster shows the presence of B. coli in one one-hundredth of a cubic centimeter. This is the condition which holds throughout the summer.

We must conclude then that the reduction of the number of B. coli in the oyster in cold weather is not due to any decrease in the number present in the seawater but is due to some peculiar condition in the oyster itself.

The only reasonable explanation of such a condition to my mind is that with the advance of the cold weather, the oyster assumes a condition of rest or hibernation, during which time the ciliary movement ceases, the current of water over the gills stops, and the process of feeding is suspended. No organisms are taken in from the water outside, and those inside are gradually eliminated so that the total number of organisms is reduced very considerably and the oyster becomes practically free from B. coli.

These observations enable us to give a reasonable scientific explanation for the common belief that oysters are not fit to eat in the summer time, but improve greatly in the winter. Perhaps it would be well, as the result of these observations, to limit the oyster season even more than at present, particularly in the case of oysters from polluted areas, by excluding the months of September and October, March and April, from the open season.

It is a fact well known to all oyster growers that there are two periods in the year when oysters are fat and two when they are lean. Oysters all fatten up in the late spring preparatory to the discharge of their sexual products in July and August. After these products are discharged there is a period of leanness which continues until the advent of the colder weather, about November and December, when the oysters fatten up again and are supposed to be in the very best condition for marketing. It is at this time that they apparently store up a reserve of material to carry them through the period of hibernation during the rest of the winter.

Of course, these conditions would apply only to oysters in our cold northern waters. There is some evidence to show however that a similar period of hibernation occurs in oysters growing farther south, but further observations are necessary to confirm this.

From these facts we must conclude that in warm weather the results of bacterial analysis tally very well with the actual conditions as determined by the sanitary survey and therefore analyses may be used to determine whether or not certain oysters may be sold for human consumption. But during the cold weather oysters judged by analyses alone would be pronounced good although they came from within a short distance of a larger sewer outfall.

We probably do not want to eat oysters which come from the immediate neighborhood of sewer outlets, even though they appear on analysis to be free from colon bacilli. Therefore, in order to exclude these oysters from the market in the winter time, the only reasonable method would be to set definite limits from sewer outlets within which it shall be unlawful to take oysters or other shellfish for use as food.

THE INTERNATIONAL CLASSIFICATION OF CAUSES OF SICKNESS AND DEATHS

Dr. Jorge Le-Roy y Cassá,

Havana, Cuba.

Ever since 1839, the date of publication of the First Annual Report of the Registrar General of Births, Deaths and Marriages in England, when the great William Farr established the first steps of a pathological classification for the registering of the causes of death, until our times the progress of this most important branch of sanitation has been slow but continuous. Indeed as a result of his practical experience in pathological nomenclature, Dr. Farr at the first Congress of Statistics held in Brussels in 1853, was selected together with Dr. Marc d'Espine of Geneva, to prepare a report on a classification which should be used in all countries in tabulating the causes of death. Dr. Achilles Guillard, a distinguished botanist and statistician created the term Demography and from these beginnings there originated the titles of the present international list. The classification proposed was accepted at Paris in 1855 and at Vienna in 1857; it was translated into six languages and was afterwards revised at Paris in 1864, 1874, 1880 and 1886. The final form was substantially the one recommended by the International Institute of Statistics, which met for the first time in Rome in 1887, later in Paris in 1889, afterwards in Vienna in 1891, at Chicago in 1893 and finally in Berne in 1895. However, it was not until 1900, at the International Congress held at Paris that an agreement was made in regard to the terms that should be employed in stating the causes of death. The resolutions of this Congress went into effect on January 1, 1901.

Cuba, who has had such statisticians as Drs. Ambrosio Gonzáles del Valle, Vincente La Guardia, Manuel Delfín, Carlos J. Finlay and Vincente Benito Valdes, at that time had the fortune to have at the head of the Sanitary Department Dr. W. C. Gorgas, a physician whose name Cubans pronounce respectfully and affectionately, who from the said date of January 1, 1901, began the publication of the Reports of Vital Statistics of Havana, following the form agreed on, which is better known as the Bertillon nomenclature.

When the American military intervention ceased and the Cuban Superior Board of Health was created, I was appointed Chief of Sanitary and Vital Statistics of the Republic of Cuba, and my first act was to include all the Cuban territory in the adoption of the International Nomenclature for the Classification of Diseases and Causes of Deaths, and since 1902 the annual reports have been published accordingly. The monthly reports since January 1, 1904 have been treated in a similar manner. The monthly reports issued during 1903 lacked the necessary uniformity because of the organization of the local Boards of Health in the several towns and cities.

Although Cuba was not officially represented at the Congress held in Paris in 1909, when the second decennial revision of the international nomenclature was made, she has in fact adhered to the proceedings of the same by accepting the resolutions, and since January 1, 1910, statistics have been published in conformity with the new titles and the classification of ages agreed at that meeting.

The object pursued by the nations which have accepted the resolutions, is to obtain an absolute uniformity in their statistics so as to make comparisons easy. Towards this end the agreement of England to change the old titles for the new ones adopted at the Paris Congress in 1909 has materially contributed; and this combined with the cordial approval of almost the entire United States of America assures the adoption of the international list by all Spanish and English speaking countries. The following countries have now adopted the international classification—the Western Hemisphere, Australia, New Zealand, China, Japan, British India, Egypt, Algeria, South Africa and of course many European countries. It is to be hoped that by the time the third decennial revision is made in 1919 all nations will have adopted the resolutions and then a comparison of the world's statistics will be an aspiration easy to carry out on account of the uniformity of the data.

It is convenient from now on to bring up some points open to criticism in the present classification, in order that they may be discussed in time so that they may be considered at the next revision.

The classification of the age groups should be modified more fully, especially in reference to the second age group. The first group includes from 0 to 1 year of age and the second from 1 to 19 years. It is conventional to divide the latter in two sub-divisions—from 1 to 9 and from 10 to 19. Personally I do this, but in order to obtain more information from statistical studies, the division of the group should be—1 to 4 years, 5 to 9 years, 10 to 14 years, and 15 to 19 years. Only by such a sub-division can the diseases and causes of death in the first and second infancies and puberty be studied. Puberty usually appears earlier in temperate and tropical countries.

Likewise the period from the 60th year on is very extensive. At the present time it is not possible to place with certainty the diseases of old age. We are also not able to study the statistics of the aged over a century old. Such questions as these are of decided importance.

The etiological factor seems to have determined the arrangement of nearly all the titles. Under the title Recurrent Fever (3) we find included Recurrent Fever and Malta Fever and its synonyms. How is it possible to group under the same title the disease caused by Spirillum obermeier and that caused by Micrococcus melitensis? Even though the recurrent febrile periods might make them comparable, yet the fact that they are produced by different organisms should put them in separate groups.

The same criticism can be applied to the title now known as Tetanus (24). Formerly it was included amongst the diseases of the nervous system. The Nicolaier bacillus being recognized as the cause of tetanus has brought about this change and transferred Tetanus to the group of General Diseases. However, Puerperal Tetanus has remained under Puerperal Albuminaria and Convulsions (138). If the cause of the disease in both cases is the Nicolaier bacillus why should some cases be included under Tetanus (24) and other cases under Puerperal Albuminaria and Convulsions (138)? It certainly is a contradiction. It must also be remembered that in the majority of cases of Puerperal Tetanus, the determining cause is an abortion, usually of a criminal nature. In a large obstetrical experience I have never met with a case of Puerperal Tetanus, but in the few instances that have come to my notice, the organism has penetrated through the genital wound in a manner similar to what would have taken place elsewhere in the body. Also Hemoglobinuric Fever is included in 122 with Other Diseases of the Kidneys and Annexa, when it should be, on account of its etiology, under 55 with Other General Diseases.

American Journal of Public Health

Official Organ of the American Public Health Association.
Published Monthly by the American Public Health Association.

VOLUME II. JANUARY, 1912. Number 1.

$2.00 a year. 20 cents a copy.

LIVINGSTON FARRAND, M. D., Editor SELSKAR M. GUNN, B. S., Managing Editor
PHILIP P. JACOBS, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

EDITORIAL ANNOUNCEMENT

Mr. B. R. Rickards, the Managing Editor of THE JOURNAL OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, found it necessary, owing to important changes in his personal plans, to present his resignation from that office at the meeting of the Association held in Havana in December. The Association is under deep and lasting obligation to Mr. Rickards for the ability and devotion with which for the past two years he has served its interests, and for the rare spirit with which he has invariably sacrificed personal considerations to the demands of his editorial task. It is a satisfaction to know that the field of public health still retains his energies, and that the Association can count upon his continued co-operation and support, even if not in an official capacity.

To meet the situation created by Mr. Rickards' resignation the Committee on Journal was given full power to make such arrangements as it might deem necessary to continue the Journal in such a way as best to further the purposes and aims of the Association.

After careful consideration of the circumstances the Committee has decided upon important changes in editorial policy and management. In reaching its decision, the Committee has kept constantly in mind the necessity of widening the scope of the Journal to keep pace with the rapid growth of the public health movement and to engage the interest of the increasing number of workers, professional and lay, whose fields come into touch with that of the American Public Health Association.

As more precisely indicative of the scope of the publication it has been decided to change its title to THE AMERICAN JOURNAL OF PUBLIC HEALTH.

In further completion of its plans, the Committee takes satisfaction in announcing that Dr. Livingston Farrand, Executive Secretary of the National Association for the Study and Prevention of Tuberculosis, has consented to act as responsible Editor, and, in co-operation with the Committee, to direct the policy of the new Journal. Mr. Selskar M. Gunn, Assistant Professor of Public Health in the Massachusetts Institute of Technology, has accepted the position of Managing Editor, and Dr. Philip P. Jacobs that of Business Manager. The office of publication will be in New York City. It is expected further to extend the editorial staff in such a way that the chief phases of public health activity will be represented by experts of national reputation.

The Journal will continue to publish as formerly the principal papers presented at the Annual Meetings of the Association, and will aim to represent in an authoritative way the five sections now officially recognized in the organization. Especial emphasis will be laid on notes and news concerning the various phases of public health activity, and no effort will be spared to make the Journal in every sense representative of the field indicated by its name. It is hoped to make it indispensable, not only to the army of public health officials and those professionally concerned in the field, but to the great number of social workers and others now aligned in the widespread campaign against preventable disease.

In other words, the Journal in its new form will endeavor to continue the best traditions of THE AMERICAN JOURNAL OF PUBLIC HYGIENE, made largely possible by the loyal support of the Massachusetts Association of Boards of Health, and of its successor, THE JOURNAL OF THE AMERICAN HEALTH ASSOCIATION, to which THE AMERICAN JOURNAL OF PUBLIC HEALTH now in turn succeeds.

It is to be regretted that the unavoidable complications incident to the change in management have delayed the publication of the January issue. It will be the endeavor of the new management to prepare and issue the succeeding numbers as rapidly as possible until regularity of appearance shall have been established.

ONTOLOGY IN RELATION TO PREVENTIVE MEDICINE

We have to thank the metaphysicians for, if not explaining many things, at least giving us useful terms under which discussions may be carried on. Ontology is defined "as that branch of metaphysics which investigates and explains the nature of all things or existences." While he who coined the word cannot be accused of excessive modesty, yet one may thank him for it since it does give a direction to thought, which it is well for us occasionally to take.

If one merely reads a programme, such as that of the meeting of the American Public Health Association in Havana, or a weekly review of new publications on bacteriology, one is almost stunned by a realization of the number of avenues through which disease and death march to attack the citadel of health and human life, and equally staggering is the consideration of the many defences which the individual and his self-appointed defender, the public health officer, must set up to oppose such attacks.

He is indeed pragmatic, who, in his quieter moments, resting so to speak on his arms, never asks himself the meaning of the struggle for existence. Why should he, why should man, ever have been born, if to be born simply means to begin with his first breath a struggle against death? *Cui bono?* does at once seem to be the most logical question man can ask himself. The fatalism of the Arab of the Cyrenaic desert is not unnatural, who as Dr. Sladden of the Norton Exploration Expedition tells, comes to the medicine-man thinking him all potent, but who when informed of the limitations of medical science "kindly ascribed to the will of Allah any failure to cure." Dr. Sladden adds "they are not a clean people, partly no doubt, owing to local circumstances, and partly from their oriental acquiescence in things as they are." Hence all of us are probably agreed that the Arab of the desert with his life ever in danger from tribal feuds or from disease begotten of indifference to life and acquiescence in the will of Allah, has in no way solved the problem of life and we turn with joy to western civilization with all its failures, yet having real struggles, and still ask with Browning in Sordello:

"Must life be ever just escaped which should
Have been enjoyed?—nay might have been and would
Each purpose ordered right—The soul no whit
Beyond the body's purpose under it."

It is quite evident that the two attitudes of mind, the east and the west, toward life are as opposite poles: but while accepting the west as the only possible for us, it does seem essential that we endeavor to appreciate, from the standpoint of preventive medicine, something of the real meaning of the life struggle so magnificently pictured by St. Paul.

One need only recall the attitude of mind of King David, the sweet singer of Israel, towards his enemies to realize the existence of the good and evil demons in all old theogonies; and, viewing things as they are, we must confess that the present day has not left such conceptions wholly behind.

For the student of preventive medicine there must arise the question: In what ethical category must he place the agents of disease as mosquitos, the hosts of many diseases or the specific microbes and protozoa, their most direct causes? What is the meaning of pestis, cholera, tuberculosis or syphilis in the plan of life? One turns unconsciously to works on Evolution and Pathology, so numerous today, to seek some solution in the theories of natural selection, orthogenesis, eugenics, variation or environment; but as the reviewer says of Von Hansemann's latest book, "The origin of life is discussed at considerable length, but no solution of this inscrutable problem is reached."

But however difficult and insoluble the problem may be to the student of preventive medicine, it does not seem difficult to comprehend something of the purpose of life. Though

"Our little systems have their day,
They have their day and cease to be,"

we nevertheless have a right to say that modern science has made it plain that the First Cause which created the heavens and the earth has given us in the records of the worlds beyond us, and those of the past of our own planet, such an evidence of purpose that we are compelled in turning our thoughts upon life to accept what is most evident, namely that progress upward is the essential end and purpose of all life: "That nothing walks with aimless feet," and that the innumerable physical phenomena called evils—the assaults of demons of the older religions—are such so long and until man with the splendid intelligence with which he is endowed shall have learned the life conditions under which each of these evils attacking him exists, and how each in turn may either be subdued to his uses or removed from his pathway.

No one, who in any particular has ever felt in himself the glorious sense of power through overcoming, can fail to realize that this conquering of physical evil is a large step forward, successfully attacking intellectual and moral evils, perhaps more exactly termed *aberrancies*, and that in such victories lies the essence of Life.

"That men may rise on stepping-stones
Of their dead selves to higher things."

To many whose lives have been spent in the work of preventive medicine it must appear that in no other field is the pilot-star so many-hued, alluring and inspiring. To make four blades of grass grow where one was, stimulates the agriculturist; but to make the solitary places of human life glad, to see not alone an individual, a community, a nation, but a whole world freed from the Damoclean sword of death ever hanging imminent in smallpox, cholera, yellow fever or plague and other infections, as tuberculosis, is to give the worker in public health a sense of potent influence over the lives of his fellow men and of close association with every one who works for human betterment and for the uplifting of mankind. If he thinks ontologically at all, he can no longer imagine human life only an accident, flotsam and jetsam on a turbulent and never-resting sea, but rather that "being" is an emanation from the Infinite Consciousness which makes the *ego* in us the occasion for the realization, by each—even in the smallest degree—that he is a constituent atom in Universal Mind, wherein is the definite idea illustrating not alone a common humanity, but also the manifestation of a universal good.

P. H. BRYCE.

SECOND PROGRESS REPORT OF THE COMMITTEE ON STANDARD METHODS OF SHELLFISH EXAMINATION*

Laboratory Section, American Public Health Association,

At the last convention of the American Public Health Association, held in Milwaukee in September, 1910, this committee presented a preliminary report on standard methods of shellfish examination. During the year these methods have been put to practical test by members of the committee and by others. This has resulted in the accumulation of valuable information along several lines. The following is a second report of progress. It embodies the work of the committee during the year, asks that certain suggested standard methods of examination be endorsed, and requests, in view of certain problems still unsolved, that the committee be permitted to continue its investigations another year.

General Situation of Oyster Sanitation

One of the most gratifying features of the oyster situation at the present time is the interest that the oyster growers are taking in the question of sanitation. It is rapidly becoming recognized by all concerned that the danger of eating polluted oysters may be a real one. The Oyster Growers' Associations are recognizing the propriety of the government and other properly constituted health authorities in maintaining proper standards of cleanliness. On the other hand, sanitary experts are coming to realize that the danger from the use of contaminated oysters is one of less frequency than was believed a few years ago to be the case.

Seasonal Variations in the Sanitarv Condition of Shellfish

Attention is called to an important fact learned during the past year, namely, that there is seasonal change in the bacteriological condition of oysters, due apparently to biological causes and not altogether connected with the sanitary condition of the beds. The continued application of the tests suggested by the committee have shown that oysters from the same bed yield different results at different seasons of the year. Almost invariably the evidences of bacterial contamination have been found to be less during the winter than at other seasons. In some instances this difference has been very striking, and oysters taken from beds known to be subject to bacterial contamination have shown no evidences of B. coli during the winter, even though analyses of the water over the beds and the tests of the oysters during the summer indicated danger. This phenomenon appears to be the same along the Atlantic Coast from Virginia to Massachusetts. Whether it is universally true is something that needs to be determined, and this is one of the lines of investigation that the committee has in mind to carry on during the coming year.

The reason for the seasonal difference ought also to be established. Present indications show that it may possibly be due to a hibernation of the oyster. It is possible that during the winter the oyster maintains itself in a resting state during which the shell is kept closed so that no water enters it; while the bacteria of the B. coli group, or any typhoid bacilli that may have been entrapped in the shell, die. If the results thus far obtained are to be trusted, it may be fairly said that oysters harvested between the first of December and the first of April are much safer for use than those harvested early in the fall or late in the spring. In some places this period of winter immunity may be even longer than this; possibly in other places it may be shorter.

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*Read before the Laboratory Section, American Public Health Assn., Havana, December, 1911.

Work of the Committee

During the past year the committee has kept in touch with the analytical work that has been done and has studied with especial care the operation of the methods of analysis suggested in the first progress report. The members of the committee have corresponded frequently. On Oct. 28, 1911 a meeting of the committee was held in New York, at which four members were present, the fifth member being represented by letter. At that time the methods of analysis were thoroughly discussed and certain modifications made. On the same day the committee invited other bacteriologists interested in the subject to confer with them and with representatives of the National Oyster Growers' Association.

Revision of Schedule of Standard Tests

As a result of this conference, certain modifications were made in the schedule of tests previously submitted and a revised schedule was prepared. This schedule of standard methods for the examination of oysters, clams and other shellfish, is given below and the committee recommends that it be given the endorsement of the Laboratory Section of the American Public Health Association.

Supplementary Tests

It is not intended that the examination of oysters and other shellfish should be limited exclusively to these standard methods, for it is recognized that in some cases other tests may be required in order to obtain a true idea of the sanitary condition of the oysters. Standard methods should not be allowed to stifle progress or to interfere in any way with a search for better methods of testing. Some of the methods that were referred to in the report of last year are believed to be of value under certain conditions, but not of sufficient general value in their application to warrant them a place in the schedule of standard tests. Rather, they should be regarded as supplementary tests to be made when occasion required, or in connection with research. Some of these tests are here briefly referred to.

The determination of the number of bacteria that will develop on the agar plate after twenty-four hours incubation at 37° has been thought by some to be of value in the study of shellfish. Others think that the information to be obtained by it does not justify the requisite time and expense. It is therefore placed by the committee among the supplementary tests.

The use of liver broth, lactose bile salt, esculin bile salt, Endo's malic acid, malachite green or MacConkey's agar and other methods of determining the presence of B. coli and other gas-forming organisms, has given different results in the hands of different workers. The committee is of the opinion that such tests should be used for research purposes only. Some of these methods are thought to be quite promising, but further data are needed. A method of determining the presence of B. coli by the use of solid media that will enable one to determine not only the presence of B. coli but the number of these organisms present, is something to be desired and it is hoped that bacteriologists who are interested in this subject will continue their research until a satisfactory method has been found.

The question of the determination of other gas-forming bacteria than those of the B. coli group is a most important one. The work that has been done during the past year has developed the fact that under some conditions oysters that gave positive presumptive tests for B. coli with lactose bile do not contain B. coli, that is, they fail to give the standard confirmatory tests. This has been particularly true of oysters taken from waters into which sewage has been discharged after disinfection with chloride of lime. Apparently the use of this disinfectant destroys the organisms of the B. coli type but does not destroy all gas-producing organisms. It has been found that some of these gas-producing organisms are non spore-forming anaerobes. This is a subject that deserves further research as it involves some very important practical questions. In the first place, ought oysters to be considered safe if bacteria of the B. coli group are absent, but if other gas-forming organisms, presumably of sewage origin, are present? Or, to put the question in another way, ought oysters to be judged from the hygienic standpoint alone or from the additional standpoint of cleanliness?

The standard tests are made to apply only to the shell liquor, that is, to the water in the oyster shells in the case of shell stock and to the liquor around the oysters in the case of shucked stock. There are times, however, when it is desirable to test not only the oyster liquor but also the intestinal contents of the oysters themselves. For example, when oysters are transplanted from a polluted water to an unpolluted water, the character of the water in the shells changes quite rapidly so that at certain seasons of the year the analysis of the shell water will improve very greatly in two or three days. Tests of the intestinal contents, however, have shown that organisms of the B. coli group may live in the body of the oyster for a much longer period than that shown by analysis of the shell liquor. Instead of a few days this period may extend to several weeks. This is also true of clams. In studying the question of transplantation, therefore, it seems desirable to test not only the shell liquor but also the intestinal condition. This question of the transplantation of oysters is a most important one to the oyster growers, for if oysters can be grown in waters somewhat polluted and then made safe by transplanting them for a brief period into clean water, oyster grounds otherwise useless might be kept in service. Thus far this has been been the subject of qualitative study only. It should be studied quantitatively as well.

Interpretation of Results

The committee does not feel called upon to establish at the present time any standards of purity for oysters or other shellfish. This is a matter to be determined by the various administrative authorities interested in the subject. The work of the committee has been confined exclusively to the scientific aspects of the problem.

The Oyster Score

The committee has given careful consideration to the possible use of a method of scoring oysters, similar in a general way to that now used for scoring milk supplies. It is recognized that the analysis of oysters alone cannot always be depended upon to determine the hygienic character of the oyster beds. Inspection of the beds and their surroundings is just as important as the examination of the oysters. In the case of shucked oysters the method of handling is of great importance and should be taken into consideration in determining the hygienic character of oysters sold. A tentative form of score card has been prepared and is being tried by members of the committee. It is hoped that at the end of another year the committee may be able to suggest, for general adoption, a satisfactory method of scoring oysters.

Acknowledgements

The committee wishes to acknowledge, with thanks, valuable advice offered by Dr. George W. Stiles, Jr., Bacteriological Chemist of the Bureau of Chemistry, U. S. Department of Agriculture; Dr. Frederick P. Gorham, of Brown University; Professor Earle B. Phelps, of the Massachusetts Institute of Technology; Dr. R. P. Fitz-Randolph, Director of the New Jersey State Laboratory of Hygiene, and others.

RECOMMENDATIONS FOR STANDARD METHODS FOR THE BACTERIOLOGICAL EXAMINATION OF SHELLFISH.

OYSTERS IN THE SHELL.

Selection of Sample

Twelve (12) oysters of the average size of the lot under examination, with deep bowls, short lips, and shells tightly closed, shall be picked out by hand and prepared for transportation to the laboratory.

As complete a record of such data as is possible to obtain shall be made covering the following points:

The exact location of the bed from which the sample has been selected.

The depth of the water over the bed at time of collection.

The state of the tide.

The direction and velocity of the wind.

Other weather conditions.

The day and hour of the removal of the stock from the water.

The conditions under which the stock has been kept since removal from the water and prior to the taking of the sample.

The day and hour of the taking of the sample.

Transportation of the Sample

The oysters so selected shall be packed in suitable metal or pasteboard containers of such size and shape that a number of them can be enclosed in a shipping case capable of satisfactory refrigeration by means of ice. The important points in this connection are:

A. The prevention of the mixing of the oyster liquor of different samples, and of the mixing of the ice water with the oysters.

B. The icing of the samples, if they are not to arrive at the point of laboratory examination inside of thirty-six hours, or if the outside temperature is above 50 degrees F.

It is not necessary to enclose the oysters in an absolutely tight container, providing the above conditions are maintained.

Condition of Samples

Record shall be made of the general condition of the oysters when received, especially whether the shells are open or closed; of the presence of abnormal odors; and of the temperature of the stock.

Technical Procedure

The bacteriological examination shall be started as soon as possible after the receipt of the sample.

The oysters shall be thoroughly cleaned with a stiff brush and clean running water and then dried. The edges of the shell shall be passed through the flame or burned with alcohol.

The opening of the shell shall be accomplished by either of the following methods:

A. By the use of a sterile oyster knife in the usual manner.

B. By drilling through a flamed portion of the shell near the hinge with a sterile drill. The drill shall be sterilized, and the site of the operation on the shell shall be flamed at least once during the drilling process.

Bacterial Counts

Bacterial counts shall be made of a composite sample of each lot obtained by mixing the shell liquor of five oysters. Agar shall be used for the culture medium and in general the procedure shall be in accordance with the method recommended for the examination of water by the Committee on Standard Methods of Water Analysis of the American Public Health Association.

The water used for dilution purposes shall contain one per cent. of sodium chloride, in order to approximate the natural salinity of oyster liquor.

The agar plates shall be incubated at 20 degrees C. for three days and the colonies then counted.

Determinatinn of Bacteria of the Bacillus Coli Group

The quantitative determination of the presence of B. coli shall be in accordance with the following procedure:

Measured quantities (1.0; 0.1; 0.01 c.c., etc., or their equivalents in dilutions) of the shell water of each of five oysters selected from the dozen, shall be placed in fermentation tubes containing lactose peptone bile, prepared according to the method recommended by the Committee on Standard Methods of Water Analysis. These shall be incubated for three days at 37 degrees C., and the presence or absence of gas noted daily. For all ordinary purposes of routine work a development of from 10 to 85 per cent. of gas during this time period shall constitute a positive test indicating a presumption of the presence of at least one bacterium of the bacillus coli group in the quantity of the shell water tested. But no final B. coli rating based on these results shall be used for official approval or condemnation unless positive confirmatory tests for the presence of organisms of the B. coli group shall have been obtained from the tube of highest or next highest dilution from each oyster, showing the presence of gas. These confirmatory tests shall be begun immediately upon noting the formation of gas, and carried out in accordance with the procedure recommended by the Committee on Standard Methods of Water Analysis.

Statement of Results

The results of the bacterial counts shall be expressed as Number of Bacteria per c.c. The results of the tests for B. coli shall be expressed either in the form of the following arbitrary numerical system to be known as "The American Public Health Association Method of Rating Oysters for B. coli; or in Estimated Number of Bacteria of the B. coli Group per c.c. of the Sample."

THE AMERICAN PUBLIC HEALTH ASSOCIATION METHOD OF RATING OYSTERS FOR B. COLI*

The following values shall be assigned to the presence of bacteria of the B. coli group in each of the five oysters examined, these figures being the reciprocals of the greatest dilutions in which the test for B. coli was positive:

If present in 1.0c.c. but not in 0.1c.c., a value of 1
If present in 0.1c.c. but not in 0.01c.c., a value of 10
If present in 0.01c.c. but not in 0.001c.c., a value of 100, etc.

The sum of these values for the five oysters gives the total value for the sample and this figure shall be taken as the "rating for B. coli."

The results shall be expressed in the following tabular form:

RESULTS OF TESTS FOR B. COLI IN DILUTIONS INDICATED.

Oysters	1.0 c.c.	0.1 c.c.	0.01 c.c.	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	0	0	1
4	+	0	0	1
5	+	0	0	1
			Total, or rating for B. coli =	23

+ = Presence of bacteria of the B. coli group in fermentation tube test with lactose bile.

0 = Failure to demonstrate presence of bacteria of the B. coli group.

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* Where the term B. coli is used, it refers in all cases to bacteria of the B. coli group and not to the specific prototype.

Estimated Number of B. Coli per c.c.

If the standard B. coli rating above described is divided by 5, or, in general, if the rating is divided by the number of oysters tested, the result will be approximately the number of B. coli per cubic centimeter of shell water. Partly because it does not do this exactly, but also for simplicity and the avoidance of fractions, the method of stating results as an arbitrary rating is preferred by the committee. Practical experience with the method also has appeared to justify this preference.

Illustrations of the Application of the Method of Rating Oysters for B. Coli

Sometimes results similar to the following are obtained, that is, one or more oysters may show positive results in small quantities of shell water, while an equal number may show negative results in larger quantities. In this case the next lower numerical value shall be given to the positive results in the high dilutions, and such positive results shall be considered as being transferred to a lower dilution giving negative results in another oyster. This is done on the theory that inconsistent results, mathematically considered, may follow naturally from an unequal distribution of the bacteria in the shell water. This recession of the assigned values, however, shall not be carried beyond the point where the number of such recessions is greater than the number of instances where other oysters in the series failed to give positive B. coli results.

As examples of the method of obtaining the rating for B. coli, the following illustrations are given. They represent results that may be met with in practice.

CASE A.—RESULTS OF B. COLI TESTS IN DILUTIONS INDICATED

Oysters	1.0 c.c.	0.1 c.c.	0.01 c.c.	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	+	0	10
4	+	0	0	10 (not 1)
5	+	+	+	10 (not 100)
				——
				50=Rating

CASE B.—RESULTS OF B. COLI TESTS IN DILUTIONS INDICATED

Oysters	1.0 c.c.	0.1 c.c.	0.01 c.c.	Numerical Value
1	+	+	+	10 (not 100)
2	+	+	+	10 (not 100)
3	+	0	0	1
4	0	0	0	1 (not 0)
5	0	0	0	1 (not 0)
				——
				23=Rating

CASE C.—RESULTS OF B. COLI TESTS IN DILUTIONS INDICATED.

Oysters	1.0 c.c.	0.1 c.c.	0.01 c.c.	Numerical Value
1	+	+	0	10
2	+	+	0	10
3	+	+	+	100
4	+	+	+	10 (not 100)
5	+	0	0	10 (not 1)
				——
				140=Rating

OYSTERS REMOVED FROM THE SHELL (OPENED OR SHUCKED STOCK)

Except as hereinafter stated, all the procedures and requirements for the examination of opened oysters, i. e., shucked stock, shall be those specified for the examination of oysters in the shell.

Selection and Preparation of Sample

The stock in the container from which the sample is to be taken shall be thoroughly mixed, and one or more wide-mouthed sterile jars of a total capacity of one quart shall be each half filled with the sample by means of a clean ladle or other instrument sterilized by flaming alcohol. The jar or jars shall be so sealed as to exclude all possibility of contamination from without.

Transportation of Samples

When the time between the collection of the sample and its examination exceeds three hours, or if the outside temperature is above 50 degrees F., the sample shall be thoroughly refrigerated by means of ice placed around, but not in, the sample jars.

Technical Procedure

The bacteriological examination shall be begun as soon as possible after taking the sample. The sample shall be thoroughly shaken at least twenty-five times immediately before opening.

Bacterial Counts

The procedure specified for oysters in the shell shall be followed:

DETERMINATION of Bacteria of the Bacillus Coli Group.

The procedure specified for oysters in the shell shall be followed, but attention is called to the fact that higher dilutions than 1/100 c.c. are usually required. Triplicate fermentation tubes shall be inoculated from each dilution of the sample.

Statement of Results

The results of the bacteriological examination of the opened oysters, or shucked stock, shall be expressed in the same way as that specified for oysters in the shell, except that in the calculation of the B. coli rating the values for the results of the positive fermentation tests after confirmation shall be recorded for each of the inoculations of each dilution. In order that the rating from these triplicate tests may be compared with that obtained from testing five oysters in the shell, the sum of the values for the triplicate tests shall be multiplied by 5/3. If, instead, the sum is divided by 3, the result will give approximately the number of B. coli per c.c.

CLAMS AND OTHER SHELLFISH

The methods for examining clams and shellfish other than oysters shall be those given above. Certain modifications are necessary in the method of handling the samples and the opening of the shells, etc.

Clams are more likely to lose water during transportation than oysters. It is therefore necessary to take greater precautions to separate different samples of clams from each other than in the case of oysters.

In opening soft clams it has been found that if two incisions are made through the mantle the shell water may be poured out without opening the shell.

Hard clams are more difficult to open, but if the shell be struck over the dorsal muscle with a small hammer an opening will be formed permitting the insertion of the knife to cut the muscle.

Sometimes clams and other shellfish contain too little liquor to make all of the tests above described. This is always the case when the shells are very small. Under these conditions the water from two or more shellfish shall be taken together and tested and considered as one.

Respectfully submitted,

GEORGE C. WHIPPLE, *Chairman.*
A. W. FREEMAN.
STEPHEN DE M. GAGE.
WILLIAM ROYAL STOKES.
H. D. PEASE, *Secretary.*

REPORT OF THE COMMITTEE ON STANDARD METHODS OF PREPARING DIPHTHERIA ANTITOXIN*

A committee on standard methods of preparing diphtheria antitoxin was appointed at the meeting of the Laboratory Section of the American Public Health Association in Milwaukee, held September, 1910. The committee consisted of the following members: Dr. H. D. Pease, Dr. William H. Park, Dr. John F. Anderson, Dr. A. Parker Hitchens, Dr. P. G. Heinemann. It is the consensus of opinion of the committee that the meaning of standard methods as applied to water and milk analysis is different from the meaning of standard methods in the preparation of diphtheria antitoxin. Inasmuch as the results of preparing antitoxin, no matter by which methods, are comparable, while the results of water and milk analysis are comparable only if obtained by identical methods, the committee decided that the problem must be approached rather by a compilation of the methods in actual use, than by prescribing methods.

Several workers outside of the committee were approached, among whom Prof. Theobald Smith, Dr. William R. Hubbert, and Dr. Edwin J. Banzhaf gave valuable contributions. At the suggestion of Prof. Smith a series of questions was submitted to the members of the committee and to Prof. Smith, Dr. Hubbert and Dr. Banzhaf. These questions covered the ground exhaustively and the answers are compiled as appear below:

1. *The Culture.*—The culture used in all laboratories is Park and Williams No. 8. The culture is preserved in blood serum. For current use it is indefinitely transferred on toxin broth (see below) by transfers every day or every two days. Film formation is natural to the culture, but is perhaps aided by transferring from the film.

2. *The Preparation of the Toxin.*—One pound of beef or veal is covered with one liter of water. This is digested over night by some in the cold, by others at room temperature. The muscle sugar is removed by inoculation with B. coli in some laboratories, but this is not considered of advantage by most workers. The juice is expressed and 0.5 per cent. NaCl and 1.5 to 2 per cent. peptone added. The mixture is boiled and the reaction made neutral to litmus by one contributor, another makes it neutral to phenolphthalein, while the majority make it 1 per cent. to 1.2 per cent. acid to phenolphthalein. The broth is then filtered into 2 liter wide-mouthed Erlenmeyer flasks or into Fernbach flasks, and each flask made to contain 500, 800, 1,000, 1,500 or even 2,000 cc each. Dextrose is added in amounts varying from 0.1 per cent. to 0.2 per cent. In two cases no dextrose is added. The majority consider the addition of dextrose of distinct value. The dextrose is added before the flask is sterilized, but in the majority of cases it is sterilized separately in tubes and added immediately before inoculation of the flasks with the culture. The broth is sterilized in the

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*Read before the Laboratory Section of the American Public Health Association, Havana, 1911.

autoclave, by some at 105° C. for 10 minutes, by others at 120° C. for 30 minutes. The latter seems to be most in favor.

The broth is inoculated with a piece of the film of the diphtheria culture from a tube and incubated for 6 to 8 days at temperatures varying from 34 to 37° C. Tests for purity of the toxin are made by microscopic examination, also, by some, with litmus for degree of acidity, and by Smith's fermentation tube method for anaerobes, and by plants in agar. Phenol, tricresol, and chloroform are used as preservatives, in quantities of 0.25 per cent. to 0.5 per cent. The toxin is finally filtered through paper, or asbestos wool, and by some through a Berkefeld filter.

Horses.—No attention is given to breed of horses. Generally any horse is used, no matter what age or weight. Very young animals are rejected. Working horses are preferred to spirited driving horses. Some prefer good-sized work horses about 8 years old, although horses of twice that age have given excellent results. Carriage horses seem not to be suitable. The advantage of heavy horses is, that more blood can be taken at each bleeding.

Exercise and careful feeding is generally practised. The horses are always tested with mallein and the test repeated if suspicious symptoms appear. Tetanus antitoxin is given at intervals of one to three months. The tuberculin test is rarely made. The serum of horses with severe bacterial abscesses is not used, but if the abscesses are sterile, as is frequently the case, the serum may be used.

There seems to be nothing definitely known about a relation between temperature curve and productiveness. A moderate reaction at least seems desirable. One contributor considers the period required for recovery from temperature as indicative of productiveness, i. e., the quicker the recovery, the more likely is a good result.

The health of the horses should be well cared for. If the digestion is not normal, the teeth are frequently at fault. Washing, cleaning, and currying is advised.

Injections.—Subcutaneous injection is generally practised, excepting in one report, where intramuscular injection is advised if large doses of the toxin are given. The needle is connected with a graduated cylinder, or a bottle containing the requisite amount of toxin, by a rubber hose, and pressure produced with a double bulb or a tire pump. The place of injection is the neck or shoulder. One contributor advocates injecting as nearly as possible in the same places. A dose of antitoxin is usually given a day previous to the first injection. After that small increasing doses are given at frequent intervals, usually every second day. The intervals between injections vary according to the condition of the horse. The temperature should be normal or nearly so before another injection is given. After large doses are tolerated the interval is lengthened and the amount of toxin injected increased more rapidly. Finally injections are given twice a week. The maximum amount of toxin given varies in different laboratories from 100,000 M.L.D. to more than 500,000 M.L.D. The greatest amount injected in one place is 150 to 200 cc.

Two somewhat different methods of immunizing the horses seem to be practised. The first is rather conservative. The doses are increased slowly and the maximum is not beyond 100,000 or 120,000 M.L.D. The second method is to push the animals as fast as they will stand it and increase the doses until about one liter of toxin is given. Advantages are claimed for both methods. The conservative method saves horses, but usually yields sera of low potency. The second method yields high potency sera at the expense of animals.

The first test for potency is made after 30,000 to 40,000 M.L.D. are tolerated, or, as stated in one case, when temperature reactions are overcome in short time. From five to ten days are allowed to elapse between the last injection and the bleeding, the interval varying in different laboratories. Research is necessary to determine the highest point in the curve of antibody formation. Some maintain that 5 to 6 days gives the best results, the other extreme being 9 to 10 days.

It is generally stated that toxins of very high potency are not desirable. If the M.L.D. is 0.003 the results seem to be the most favorable. For large doses the toxins may be of higher potency, for smaller doses of lower potency. At the beginning of immunization some workers advocate diluting the toxins with salt solution, so as to increase the volume, or to heat the toxin to 60° C. in order to attenuate it. The general principle seems to be to inject a relatively large volume in order to hasten absorption. As the volume of toxin increases with increasing doses, the higher potency toxins are more suitable, because the volume is not so large and the injection of foreign proteins, etc., is reduced to a minimum. Local irritations are reduced in this manner.

Bleeding of Horses.—A metal canula or a trocar is forced into the jugular vein through the skin or after making a small incision. The trocar or canula is connected with a sterile rubber hose and the blood guided into jars, or bottles stoppered with cotton or covered with filter paper. If the serum is to be concentrated the blood flows into a solution of sodium citrate or potassium oxalate. These solutions are calculated so as to make the final mixture with the blood contain 1.0 per cent. sodium citrate or 0.1 per cent. potassium oxalate. Coagulatión is thus prevented and the yield is considerably higher.

From six to eight and a half liters are withdrawn at each bleeding. The intervals between bleedings are from 6 to 24 days, the custom not being the same in different laboratories. The more conservative method is to bleed every three to four weeks. In other laboratories the horses are bled every week or two. From one to three days are allowed to elapse between the bleeding and the first subsequent injection.

The serum or plasma is drawn off after 24 to 48 hours by suction or creating a vacuum. It is preserved in sterile bottles in an ice chest.

Sera of less potency than 200 units are usually discarded.

Refining and Concentrating Sera:—By far the greater amount of all serum is refined. The following method is described by Dr. Banzhaf and yields the best results:—

The plasma is diluted with one third its volume of water containing 3% NaCl, and the diluted plasma heated at 56° C. for 15 to 18 hours. It is then cooled and enough saturated ammonium sulphate solution added to make a saturation of 30 to 36%. The precipitate is filtered off and extracted with saturated NaCl solution. The filtrate is measured and enough saturated ammonium sulphate solution added to bring the saturation to 54%. The precipitate is filtered off, pressed out to remove as much liquid as possible, and then dialyzed for 7 to 9 days, or until practically all ammonium sulphate is removed.

The NaCl extract of the first precipate is precipitated with acetic acid, the precipitate pressed out and the NaCl and ammonium sulphate dialyzed out.

This precipitate has to be neutralized with sodium carbonate.

The dialyzed globulin solutions are sterilized by filtration through Berkefeld filters. Tricresol 0.3 to 0.4% or chloroform in the same quantity are used as preservatives.

The finished product should contain no more than 18% total solids, and ammonium sulphate in traces.

If native sera are used these are also sterilized by filtration through a Berkefeld filter.

Tests for Potency are made in accordance with the methods prescribed by the Hygienic Laboratory.

The Return Date is six months to two years according to varying customs in the different laboratories, and according to various amounts of excess put into the packages.

Research is needed chiefly in the following lines:—

1. The most efficient method of producing high potency sera. This would mean to investigate the effects of toxins of different potencies, the age of toxins, whether to inject as nearly as possible in the same places, or in different places, whether to give large or small doses, etc.

2. Is the production of antitoxin due to individual differences, to differences in race, to differences in age, to differences in temperament of the horses?

3. The relation of the constituents of normal horse blood to the constituents of blood from immunized horses.

4. At what period is the potency of the serum the highest? This should include an investigation of the immunity curve between injection and bleeding as well as the general curve during the whole period of usefulness of the horse.

There are minor points which need investigation, but the four points of research mentioned are perhaps the most important ones at the present stage of our knowledge.

The committee believe that this summary covers the ground as thoroughly as is possible as the present state of our knowledge warrants. Publication of this report will undoubtedly bring about more uniform methods than have been in vogue, and will be of eminent advantage to all those engaged in the production of diphtheria antitoxin.

Signed

P. G. HEINEMANN, *Chairman.*
JOHN F. ANDERSON.
A. PARKER HITCHENS.
WM. H. PARK.
H. D. PEASE.

PUBLIC HEALTH NOTES

Public Health in England and Wales in 1910

The 40th Annual Report of the Local Government Board of England and Wales (1910-1911) presents many matters of interest that illustrate the remarkable influence of sanitation on the public health.

The average annual death-rate per 1,000 population for the last four decades is thus given:

	1871-80	1881-90	1891-1900	1901-10
England and Wales...........	21.4	19.1	18.2	15.3
London	22.5	20.3	19.2	15.1

It will be seen that the death-rate in the last ten years was 20 per cent. lower than in the 1871-80 decade.

However remarkable the general decline in the death-rate is, that of London alone is yet more striking. The death-rate for England and Wales in 1910 was only 13.5 per 1,000.

The table showing the infant mortality death-rate is also worthy of reproduction. The figures represent average infant mortality rates per 1,000 births.

	1871-80	1881-90	1891-1900	1901-10
England and Wales	149	142	154	127
London	158	152	159	126

The marked decrease in the last decade is most apparent. It is interesting to note that the infant mortality in 1910 was 30 per cent. lower than in 1901.

The death-rate from typhoid fever fell 68 per cent. between 1901 and 1910, being only 5 per 100,000 in the latter year. First among the causes of this enormous reduction in the amount of typhoid fever has been the general provision of public water supplies.

Regarding the decrease of typhoid fever in that part of Essex bordering the River Thames, the report speaks of the same being due to "the abandonment, entire or partial, of contaminated layings of shellfish. Before that, where most shellfish was collected and consumed locally, there the disease was most prevalent."

The report also refers to Dr. Hamer's investigation into certain localized prevalences of typhoid fever in London in which he stated that the outbreaks were "best explained on the hypothesis that these groups of cases were due to the eating of contaminated fried fish." The facts set out in Dr. Hamer's report appear to support the hypothesis that the fish used in the "fried fish shops" (and commonly imperfectly cleaned) "brought their infection with them, possibly from the estuaries in which they have been caught." It is pointed out that if this is so "the temperature attained in some portion of the interior of the fish during frying must be much lower than is generally supposed." An epidemic of over 100 cases of typhoid fever is described in which ice cream was shown to be the vehicle of the organisms. As illustrating a further limitation of secondary contact infected cases, the report points out that in London in 1890, 18 per cent. of typhoid fever cases were treated in hospitals as against 40.3 per cent. in 1910.

The death-rate from scarlet fever during the period 1901-1910 has decreased from 13 per 100,000 to less than 6, a decrease of over 50 per cent. Similarly, the death-rate from diphtheria has decreased from 27 to 12 during the same period. The report, in referring to the parallelism shown by typhoid fever, scarlet fever and diphtheria, says that "it is tempting to ascribe this decline in all three cases to the common cause of steadily improved sanitation, and all that is implied in better public health administration. Improved housing and cleansing, more prompt and more complete recognition of disease, and more exact measures for preventing the spread of infection by hospital and home isolation, and allied means, have doubtless borne a large part in the reduction of these three diseases. For the case of scarlet fever, however, there has in addition been a striking decline in the severity of the disease. There is little room for doubt that treatment in isolation hospitals, under satisfactory conditions, has favored greatly a lowered fatality in this disease; and this cause of diminished severity may be expected to continue."

There was not a single death in London from smallpox in 1910 and only 19 in all England and Wales. One of the most important decreases in the deaths from a single cause is noted in connection with tuberculosis. The death-rate for consumption for England and Wales dropped 14 per cent. between 1901 and 1909 and in London it declined 33 per cent. between 1901 and 1910. The report states that if the death-rate from pulmonary tuberculosis had been "as high in 1909 as during an average year of the period 1871-1880, the number of deaths from the chief of the tuberculosis diseases would have been 78,308 instead of 38,639." The remarkable decrease is attributed to 1, better housing; 2, improved habits of the people, and 3, increasing dissociation of the sick from the healthy on account of increasing hospital and institutional care of consumptives.

Space prohibits further reference at this time to the subjects contained in this report, which are of interest to readers of the Journal.

The signature of Dr. Arthur Newsholme subscribed to the report is a guarantee for its scientific accuracy and lends great weight to the conclusions which are drawn. Anyone who reads it will necessarily feel most optimistic of the value of sanitary endeavor.

Visiting Nurses as Sanitary Inspectors

In the January number of the Visiting Nurse Quarterly, Emily W. Dinwiddie makes a strong plea for more recognition and use of the visiting nurse as a sanitary inspector. "Few have a readier opportunity," she says, "or a more obvious motive for working for the sanitary improvement of dwellings than the nurses who visit cases of illness in the houses.

"They know tuberculosis patients whose recovery is retarded by living in dark basements or ill-ventilated rooms. They tend the sick babies who, breathing bad air in crowded bedrooms, disturb by their crying the tired-out workers sharing the cramped quarters. These nurses appreciate the danger resulting from the common use of sanitary facilities by families with infectious diseases, and such conditions making quarantine almost impossible. They see the suffering of overwrought, neurasthenic women in noisy, congested, ill-smelling homes. They know only too well these and many other victims of environmental conditions.

"Often their work is hopeless until the patient's surroundings can be changed or the patient got out of them, but their first-hand knowledge of the situation and their relations with the families many times make it possible for them to bring about improvements where it would be very difficult for anyone else to do so."

Cold Storage Law Upheld

In a recent case before the New York State courts, the constitutionality of a cold storage law passed last year was upheld.

The Greenwich Cold Storage Company, the defendant, was charged witht receiving on July 12th last fifty-six barrels of food stuffs, and failing to mark either the packages or the contents according to the requirements of the Cold Storage Law. The plea of the defendants was that the law was unconstitutional. Referring to the decisions of the Court of Appeals in cases brought for infraction of the Oleomargarine law, where it was held that the regulation of the marketing and selling of oleomargarine are within the province of the Legislature, the opinion says:

"That same doctrine controls in this case; not in respect to the wholesomeness and nutritiousness of the food product, but to the reasonable certainty of the information which purchasers may have as to what they are actually buying so that they, having any preference or prejudice, may determine for themselves what food they shall select."

In summing, up the court said:

"None of the predicated grounds of unconstitutionality are herein applicable. There has been no invasion of the rights of the defendant, or of others similarly situated; no deprivation of property; no lien for storage compensation in anywise has been affected; no obnoxious discriminations between articles of food is the result, and since June 15 the obligation of no contract has been and could not have been impaired."

The Greenwich Cold Storage Company was fined $400.

South African Branch of the Royal Sanitary Institute

The South African Branch of the Sanitary Institute held a congress in Cape Town on November 9th, 10th and 11th last. This was the first sanitary congress to be held in British South Africa, and a large number of delegates were present from municipalities and other authorities interested in sanitation. Among the subjects discussed were "The Disposal of Sewage," "The Prevention of Tuberculosis," "The Inspection of Food and Milk Supplies," and "School Hygiene"; papers were also read dealing with other aspects of public health work. The South African Branch, which has only recently been established by the Royal Sanitary Institute, seems to be energetically carrying on the traditions of the parent Institution, and no doubt its work will have a beneficial effect in the development of public health administration in the Union of South Africa.

Austrian Prophylactic Society

A society for the prevention of diseases and epidemics (Gessellschaft zur Bekampfung von Volksseuchen) has been founded in Austria which will act in concert with the Public Board of Health and Sanitary Department of the ministry of the Interior. Its aims are to supplement the endeavors of the public authorities in combating diseases, to improve the general circumstances of patients and their families belonging to the poorer classes, to provide adequately trained attendants for the care and nursing of patients during epidemics, and to organize medical help and hospital accommodation in non-epidemic times. The society will also encourage investigation relative to the spread of diseases, as well as their prophylaxis and treatment, and will, so far as possible, make the general public acquainted with the results of these scientific researches. The society will endeavor to improve the knowledge, not only of the so-called epidemics, but also of all diseases which prevail extensively. The present intention is that the scientific part of the work shall be divided amongst all practitioners in the country through the instrumentality of the local medical unions and councils.

Bakery Inspection

Before the New York State factory investigation commission, New York City Health Commissioner Lederle advocated regular inspections to insure the personal cleanliness of the cooks as well as of the bakers of New York City. "I would examine not only the bakers as to their personal cleanliness," said he, "but also all employees engaged in the preparation of food products. I would begin with the cooks, public and private, in the interest of public health." Doctor Lederle said that with the present appropriation the health department has not the money to employ sufficient inspectors to oversee the personal cleanliness of the bakers, much less of the cooks. Earlier in the same hearing Dr. Michael H. Barsky told of finding 198 bakers, whom he had examined, badly in need of baths and had urged that the physical inspection be required.

The New Public Health

Dr. Hibbert W. Hill of the Minnesota State Board of Health, has taken up an education of the people—and even health officers themselves—in outlining what he terms "The New Public Health." There is so much popular lore, which is almost folk-lore, in common health practices, and so much of what was done formerly in the best of faith is antiquated and out of date, that Dr. Hill has undertaken to put plainly the principles that underlie modern work.

He outlines the present position and notes that within official health circles bacteriology, clinical observations and mathematics have furnished much of the ground for reconstruction. The bacteriologist, the sanitarian and the vital statistician, sometimes working together and more often alone in the dark, and occasionally at cross purposes, have nevertheless all reached the same point and today find themselves together. Much of the work has been the clearing away of the fallacies built up by tradition, but construction work has also gone on and it is now possible to formulate the results.

"The essential change is this," writes Dr. Hill, "the old public health was concerned with the environment; the new is concerned with the individual. The old sought the sources of infection in the surroundings of man; the new finds them in man himself."

The old public health sought the causes of disease in the air, in the water, in the earth, in the climate and topography of localities, in the temperature of the ground at different depths, in the rise and fall of ground water, in fact everywhere where they were not. The failure of the old public health lies in this, and the faithfulness and conscientiousness with which the search was made makes the failure more evident. The new public health seeks these sources—and finds them—among those infective persons whose dejecta enter, usually by the mouth, into the bodies of other persons.

Decrease in Insanity

The report of the London County Council for the year 1910 (Vol. 2), is looked upon as containing the largest number of accurately prepared statistics on lunacy for any urban center in the world. Hence it affords a good opportunity for studying the much disputed question of increased insanity in large urban populations.

Three elements enter into the problem:

(a) The actual increase, or otherwise, in applications for admission to asylums.

(b) The large increase of patients remaining in the asylums from previous years.

(c) The larger provision made for admission and the increased accuracy in early diagnosis and admissions with a view to cure.

The total number of insane by years was as follows:

1904.	1905.	1906.	1907.	1908.	1909.	1910.
24,283	25,050	25,367	25,767	26,170	26,848	27,003

The total applications for admission were:

1904.	1905.	1906.	1907.	1908.	1909.	1910.
4,373	4,201	4,003	4,062	3,976	3,769	3,743

While it appears that a certain class of better pay-patients may not come under the observation of the County Council, yet the almost invariable decrease in applications for beds from year to year in a city whose population steadily increases, would seem to point to but one conclusion, viz.: that the number of persons annually becoming insane is decreasing. The total instances in which heredity is given as the cause of admission in 1910 was 556 out of 2,163 admissions.

Remembering that the death-rate is not more than 7 per cent. in most of the asylums, the fact that the report gives 2.39 per cent. as probably recovering 5.4 per cent. doubtful, while the remainder 92.19 per cent. are regarded as unfavorable, readily explains the inevitable increase in the asylum population from year to year.

Canadian Public Health Association

Members of the American Public Health Association will be interested to hear that the new Canadian Public Health Association held its first annual convention in Montreal on December 13th to 15th, under auspicious circumstances. The attendance was large, representative and enthusiastic, while the inaugural ceremony was a brilliant affair patronized by His Royal Highness the Governor General, the Premier and other public men of note.

One morning was devoted to discussions of specialized branches of public health, the work being divided between four sections: (1) Medical Officers, (2) Laboratory Workers, (3) Sanitary Engineers and Architects, (4) Social Workers. The two remaining sessions were given over to general meetings attended by all, attention being directed to subjects of vital interest to Canadians:—Town Planning and Sewage Disposal.

Among interesting and important papers were: Military Sanitation, Dr. Jones, Director General of the Army Medical Service; Tuberculosis in Saskatchewan, Dr. Leyman; The Conservation of Food by Cold, Dr. Bryce; Water Supply Pollution, Prof. Connell; Medical Inspection of Immigrants, Dr. Pagé; Town Planning, Dr. Hodgetts; Biological Treatment of Sewage, Dr. Brice; and papers on Child Welfare, by Dr. Adami, Dr. Helen M. Murchy, and Miss Ellen Babbitt. The papers evoked many recommendations as to courses of action and possible solutions of problems which were submitted for the approval of the association as a whole. Some of these, as the recommendation for compulsory vaccination, were unanimously approved; others were referred for further consideration to the Executive Council. The policy followed by the association was to approve those recommendations embodying general principles of sanitation, but to avoid giving a federal voice to recommendations in any way which might dictate detailed schemes to local authorities.

The meetings were held in the New Medical Buildings of McGill University, and the success of the affair reflects credit not only on the University itself, but on its Professor of Hygiene, Dr. Thomas A. Starkey, the first President of the association. Lord Strathcona also assisted with a generous gift of $2,500. The members are now looking forward to the next meeting, which will be held in the Autumn of this year.

Royal Tuberculosis Commission

The final report of the Royal Commission appointed to inquire into the relation of Human and Animal Tuberculosis has recently been published. Three intermediate reports have been issued (1904, 1907, and 1909) dealing with preliminary facts of the investigation, the results of which are summarized in this, the final report in the form of answers to the questions of:

1. The identity of the disease in animals and man.
2. Reciprocity of infection between animals and man.
3. Conditions and circumstances of the transfer of the disease from animals to man.

The conclusions of the Commission with regard to these questions are briefly as follows:

1. In view of the existence of a type of tubercle bacillus (that of lupus and equine tuberculosis) intermediate between the bovine and human types (i. e. having the culture characters of the one and the virulence character of the other), the Commission prefers to think of the latter as varieties of the same bacillus rather than as separate races, and the resulting lesions, therefore, the same disease.

Aside from the academic question of the relationship between the two organisms, there is no question of the identity of the disease itself in man and cattle—the organism in a considerable number of cases of the former being of the bovine type or variety.

2. The answer to this question is generally affirmative. "Bovine animals are not completely immune to the human tubercle bacillus and human beings can be infected with the bovine type, even the pulmonary form of the disease being sometimes caused by the bovine tubercle baccillus."

3. (a) The unmodified avian tubercle bacillus is a negligible factor in the production of human tuberculosis.

(b) The probabilities of infection of man by the ingestion of human tubercle bacilli temporarily lodged in the bodies of the lower animals, are remote.

(c) Bovine tubercle bacilli. The case for children is clear—"the evidence which we have accumulated goes to demonstrate that a considerable amount of the tuberculosis of childhood is to be ascribed to infections with bacilli of the bovine type transmitted to children in meals consisting largely of the milk of the cow." For adults the evidence is scanty, though isolated cases do attest the possibility of bovine infection.

Strong recommendation is made for enforcing and strengthening of regulations dealing with the inspection of meat and dairy produce.

The Preservation of Food by Spices

An interesting contribution to the general question of food preservation has recently been made by Conrad Hoffman and Alice C. Evans of the Agricultural Bacteriological Laboratories of the University of Wisconsin.

These observers point out that "sodium benzoate has been of particular interest because some experts maintain that it is not harmful to the human system when used in quantities that will prevent the growth of microörganisms in food, whereas others ascribe injurious properties to it, and strongly condemn its use. However, much of it has been used, especially where an inferior grade of material is utilized, and as yet there is no law preventing its use." With this in mind they have made an investigation of the preserving properties of certain spices which are commonly used, and which have not been criticized as objectionable.

Ginger, black pepper and cayenne pepper failed to prevent the growth of microörganisms, and censequently to retard the spoiling of foods. Nutmeg and allspice were found to delay the growth of such organisms, but only for a very few days, so that these spices, also, cannot be considered of practical value as antiseptics. Cinnamon, cloves and mustard, on the other hand, showed very marked powers of restraint over the growth of microbes and are to be considered as valuable preservatives. Cinnamon and mustard are considered particularly valuable, "for they are palatable even when used in proportions that prevent all growth." Cloves when added to foods in a proportion which would prevent growth gave too much of a burning taste.

The active antiseptic constituents of musard, cinnamon, and cloves are the aromatic or essential oils which they contain. Clove buds contain about 15 per cent. of essential oils, the greatest part of which is eugenol, or oil of cloves. Cinnamon gives about 0.5—1 per cent. of essential oils and about 70 per cent. of this is cinnamic aldehyde which gives cinnamon its characteristic odor. Eugenol is also found in the essential oils of cinnamon. Experiments were made to test out the efficiency of cinnamic aldehyde, and it was discovered that even the smallest portion used—a little over 1-100 of a gram to 100 grams of apple sauce—delayed growth sixty days, and that double this amount prevented growth entirely. These proportions were not sufficient to affect the palatability of the food.

Using organisms that had previously been isolated from spoiled tomato ketchup, the relative efficiency of cinnamic aldehyde, eugenol and benzoic acid was next investigated. It was found that cinnamic aldehyde possessed more marked antiseptic power than either of the other two compounds. Of the three, benzoic acid was by far the least effective.

The investigators sum up their experiments as follows: "In case of cinnamic aldehyde a concentration of two parts per 10,000 was sufficient to inhibit the growth of most organisms, only two out of the nine employed showing growth at this concentration. With eugenol five parts per 10,000 proved insufficient to prevent the growth of all organisms tried, four out of nine having grown. Benzoic acid, on the other hand, revealed a much weaker antiseptic action than either of the above, eight forms out of nine growing in a concentration equivalent to ten parts per 10,000 and five out of nine in a concentration of twenty parts per 10,000, while three others showed doubtful evidence of growth." In conclusion the authors recommend the use of cinnamon and cloves as against such spices as pepper and ginger, and suggest that the more liberal use of the two former spices may perhaps remove the necessity of adding sodium benzoate for preserving ketchup—a practice to which there has been so much objection.

The full paper is to be found in the Journal of Industrial and Engineering Chemistry, November, 1911, pp. 835-838.

Delayed Diagnosis in Diphtheria

The following is reproduced from a recent number of The Medical Officer (London):

Dr. F. Graham Crookshank, in his final report as medical officer of health for the Barnes Urban District, suggests that the relative infrequency of diphtheria nowadays is unfortunately a cause of hesitancy on the part of many medical men in dealing with the disease. He writes: "A child is seen with croupy symptoms. The medical man in attendance recognizes the danger, administers antitoxin, and within a few hours the child is apparently well again. The doctor, whose promptness has probably saved the child's life, bears the odium of being an alarmist, and earns the undying hostility of the child's parents. In another case the medical man, less decisive in his methods waits till death is impending before making a diagnosis. There are a few hours of confusion and anxiety, much futile administration of remedies, and perhaps death-bed tracheotomy. The relatives are quite happy, and complacently assure each other that 'everything has been done.'" Dr. Crookshank declares that it is this attitude on the part of the laity that helps to keep up the death-rate from diphtheria—a disease that need never be fatal if medical aid be sought at once, and if antitoxin be confidently given as soon as possible.

The Common Towel Prohibited in New York City

An amendment to the Sanitary Code of New York, adopted Jan. 5, 1912, prohibits the use of common towels by any person, firm or corporation in any public lavatory, public comfort station, railway station, ferry-house, school, hotel, theatre, concert-hall, dance-hall, department store, café, restaurant or saloon. A common towel is defined by the ordinance as any towel used by more than one person.

The Planning of School Classrooms

In a paper in the December number of the Journal of the Royal Sanitary Institute, W. H. Webb discusses this important subject. He states that classrooms in American and continental schools are superior to those in English schools, largely because of more provision for gangways, greater distance between desks and better left-hand lighting.

Rectangular classrooms having length and width in the proportions of 3 to 2 or 5 to 3 are stated to be the most satisfactory, and the height should not exceed 13 feet. Many continental authorities agree that a room for the sake of its acoustics should not have a width greater than one and a half times its height. The author recommends the use of a cement dado in preference to glazed bricks or tiles, and points out that the wall above should be made of a softer plaster than is now used, both for acoustic reasons and to prevent undue condensation. The surface should be as smooth as possible and all angles rounded. The most valuable tints for reflecting light upon walls are those of sagegreen with about two-thirds of the body of the paint white.

Flooring should be noiseless, warm, hard, jointless, free from tendency to splinter, as inexpensive as possible and cheap to maintain. Webb does not encourage the use of oil or other dust laying preparations. He indicates that their use can be avoided by properly constructed floors. It is stated that monolithic floor coverings (made of sawdust, asbestos, and cement with a coloring pigment) are good, but that they are apt to be friable and crack at times. The writer strongly advocates the use of linoleum which he says is becoming more and more popular. It is warm, smooth, easily cleaned, reasonably durable, economic and hygienic.

The southeast aspect is approved of as the best, and the building should be laid out so as to secure the largest number of rooms looking in that direction.

The problem of lighting school rooms is given considerable attention, and it is pointed out that many authorities on the subject agree that in order to secure good lighting, each desk (photometrically measured) should have from 10 to 20 lux, but with a minimum of 15 lux in rooms where sewing or drawing is taught. Continental class rooms have usually but three rows of desks, while 4 or 5 are common elsewhere. The rule of window area to floor area of 1 to 5, usually adopted in England, is sufficient if rooms are not wider than 18 or 20 feet and provided that the windows are high. Mr. Webb refers to the work of Mr. Engelbrecht, State Inspector of German schools, who has devised a simple formula for the determination of the required window area of a schoolroom. This is given as follows:

$$f = \frac{F}{5} \times \frac{x^2}{387}$$

where f = window glass in square feet; F = given floor area in square feet; x = width of classroom in feet.

If this formula is applied to a room 24 feet square the required area of window would be found to be about one third of the total floor space, demonstrating the fact that the usual ratio of 1 to 5 cannot be applied to a class room of this size.

Sanitary District of Chicago

The report on Sewage Disposal of the Sanitary District of Chicago, recently issued, deals with one of the largest sewage disposal problems awaiting solution anywhere. The conditions under which the Chicago Drainage Canal was constructed are well known, and outside appeals for relief, once in vain, are now being replaced by the demands of the city itself. The report is essentially the work of George M. Wisner, chief engineer of the district and summarizes very fully not only the problem to be dealt with but also the several factors in its proposed solution.

The legal dilution under the Act of 1889 demanded a flow of 3.3 cubic feet of water per second for every 1,000 of population sewering into the canal. This has in practice been maintained. Its object was essentially to prevent a nuisance. During the summer it is found that all the dissolved oxygen is practically exhausted by the time the sewage leaves the large sewers.

As would be expected, "it seems probable that sedimentation and oxidation have effected most of the self-purification." It is noted that the consumption of dissolved oxygen proceeds much faster at the start and at a diminishing rate until it is all exhausted, in a very putrescible mixture or reaches the minimum in a more stable condition." The deposits in the canal are enormous. The amount already is 2,338,334 cubic yards and this is constantly affecting the efficiency of the canal by exhausting the available oxygen and lessening available water of the canal. It hence becomes essential that as far as possible the sewage should be kept out of the canal by settling tanks, and that all manufacturing wastes should be excluded as well.

It is estimated that from human sources alone there is deposited anuually 137,000 tons of dry material or 640,000 cubic yards of liquid sludge. Mr. Wisner points out after comparing this amount with that of garbage and ashes that "the disposal of sludge should not be much more expensive than the disposal of ashes and rubbish."

The report then deals with other methods of sewage disposal, such as: (a) screening with 40 meshes to the inch which removes 20 per cent.; (b) settling which removes from 30 per cent. up to 70 per cent. of the suspended matter in a period of 4 to 8 hours flow; (c) sewage farming which is set aside as wholly impracticable in the present case; (d) sand filtration and contact beds which are not approved of on account of cost; (e) sprinkling filters which offer at present the most feasible means of assisting the purification by removal of the fine suspended matter and its more or less complete oxidation.

These experiments show that with a bed of stone 1¼ to 2 inches in size and 6 to 7 feet deep, a yield of some three million gallons per acre may be expected, giving a stable effluent most of the year.

It is recommended further that mechanical aeration of the sewage be experimented with.

It is recommended that as a preliminary to further work, Imhoff or Emscher tanks be installed for the large sewage areas. "The tanks taken as a unit have a nominal settling capacity in a two-hour period of about 300 gallons per capita daily and a volume available for sludge storage for a period of six months." The extent of these will be estimated on a dry weather basis of flow of about 6 cubic feet per second per square mile of town area.

Various schemes for the disposal of the sludge from tanks are described. The importance of that from the Emscher tank as being more completely digested and more readily dried being emphasized. Assuming the tanks to be along the canal the clever suggestion is made that centrifugal pumps on a sludge boat, connecting with the digestion chambers of the tank may be utilized.

Altogether, owing to the special matters to be dealt with in Chicago, the report is especially valuable for its suggestions on the several distinct points.

Shellfish and Disease

A special supplement to the report of the Medical Officer of the local Government Board of Great Britain for 1909 and 1910 contains a valuable report by Dr. H. Timbrell Bullstrode on Shellfish other than Oysters in Relation to Disease. The principal shellfish dealt with are mussels and cockles, but in a good deal of the evidence cited, these are not sharply distinguished from oysters, the data referring to shellfish in general.

Some very good statistics are given in regard to the proportion of shellfish users among typhoid patients and the general population, especially those at Ormsby where 25.8 per cent. of the typhoid patients had eaten shellfish, while among 827 persons who had not typhoid, only 7.3 had eaten shellfish during the same period. Epidemics attacking a number of persons at the same time appear, however, to be rather rare, except in the case of oysters. There was, however, a rather striking case of Guildford in 1904 due to the consumption of butter fish (a species of shellfish—Tapes—not the fish we call by this name here). Dr. Bullstrode's conclusions are, however, conservative and he points out that while in many towns there was a decrease in typhoid fever following a campaign against shellfish, yet the same decrease took place about 1900 in other towns where no attention was paid to the subject. He rightly concludes, however, that mussels and cockles have been shown to be the cause of diarrhoea and of typhoid fever when taken raw and from polluted sources.

Milk Borne Typhoid Traced to a Carrier

Doctors Bolduan and Noble of the New York City Department of Health* report an outbreak of 380 cases of typhoid in New York City toward the end of August, 1909, which were traced to a dairy farm (exceptionally clean and well kept). The dairyman had typhoid fever in Wisconsin in 1863 or 1864. Six cases of typhoid fever occurred on the farm between 1878 and 1909, and the stools of the dairyman showed an almost pure culture of typhoid bacilli. The authors point out "that milk may be infected by a chronic bacillus carrier handling it, even though he be particular in his habits. This particular dairyman was a better class dairy farmer who kept his home and dairy much cleaner than the average dairyman. Moreover, he was personally clean. The occurrence of repeated infections in this case shows the danger of having bacillus carriers on a dairy."

Bacteria in Sewer Air

Dr. F. W. Andrews reports further experiments on this subject in the supplement of the report of the medical officer to the Local Government Board for 1910-1911. His work consisted in discharging cultures of B. prodigiosus into sewers and house drains and detecting the organisms in the air by means of agar plates. His results correspond with those obtained by other observers showing that bacteria in sewage are discharged into the air by splashing. The numbers, however, were very small and closely related to the intensity of the splashing. He concludes as follows:

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*Journal American Medical Association, 58, 7.

"While the experiments prove the possibility of the escape of sewage bacteria into the air of house drains, in absence of an intercepting trap, we must not lose sight of the fact that the test organisms were present in the sewage to the number of hundreds of thousands, and in one case of at least a million per c.c. No one has ever suggested that pathogenic bacteria are present in sewage in numbers approaching this. In this country we may take the typhoid bacillus as the pathogenic organism most likely to be present in sewage. Yet no one has ever pretended to recover this bacillus from sewer air under natural conditions, and from sewage itself it has been recovered, if at all, only under exceptionally favorable circumstances and in very small numbers. These considerations must very largely discount any possible chance of harm arising from the escape of sewage bacteria into house drains even when no trap is present."

Protection of Construction Camps on the New York Water Shed

Mr. A. J. Provost contributes to the Journal of the New England Water Works Association for September 1911, a detailed account of the admirable methods employed to protect the Croton water supply from the construction camps within its water shed. All human discharges are promptly incinerated. Liquid camp wastes from kitchens, laundries, etc., are passed through a sand filter and finally treated with bleaching powder as is all storm water. Each camp has a medical officer on call who examines all applicants for work and vaccinates all those who are accepted. Each camp maintains a hospital with beds for two per cent. of the force. Camp buildings are well and carefully built and the whole work is a model for those having problems of this sort to deal with.

Grinder's Consumption

The annual report of Dr. Scurfield, Medical Officer of Sheffield, England, is as usual, full of valuable statistics for those interested in the problem of industrial tuberculosis. The statistics tabulated in the present volume show that whereas the death rate among females is considerably below that for all England, the rate among males in middle adult life is over 50 per cent. greater. The tuberculosis death rate for all males in Sheffield is 2.7 per thousand; for grinders, 14.8. The death rate from all causes for males is 16.4 and for grinders, 24.9. The ratio of tuberculosis to total deaths is lower than in this country, but the ratio for grinders is just about what we find in corresponding industries here. From the Sheffield figures we can infer that when about one-half the deaths in a dusty trade are due to tuberculosis, this means that about ten persons out of every thousand employed die every year as a direct result of the conditions of the trade.

IndustrialHygiene

The fourth number of the first volume of the American Labor Legislation Review, containing the papers read at the recent Congress in Chicago, should be read by every one interested in industrial problems. Mr. John Calder of the Remington Typewriter Works, contributes an admirable discussion of the various methods by which the state and the employer can prevent accidents. Mr. Robert J. Young of the Illinois Steel Company, discusses the details of accident prevention as they have been so admirably worked out by that corporation. Prof. Commons presents a plan of organization of the Industrial Commission of Wisconsin which has power to prescribe whatever regulations it chooses for the protection of the worker. When a case comes up in the lower court, the only question that can be discussed is whether the standard set by the commission was followed out or not. Reasonableness of the device required by the commission can only be brought up before the court at the state capitol and from there it goes direct to the Supreme Court. Mr. E. T. Davies contributes an admirable account of the details of factory inspection as carried out in Illinois. In the Engineering News for January 18, 1912, is a detailed account by Mr. O. Schott of the methods employed in Germany for the elimination of dust in portland cement plants by filtration, by sedimentation and by centrifugal action. The problem has been brought to the fore in this industry by the commercial gain to be attained by saving the cement, but many of the lessons learned might be applied on a wider scale.

Profits from Garbage Reduction

The economic results of garbage reduction under municipal operation are discussed for Columbus, Ohio, in the Engineering News for October 26, 1911; for Cleveland in the same journal for November 30, 1911. In both cases it seems clear that a considerable profit has been realized over and above the cost of treatment. It seems certain now that garbage reduction operated by the municipality may be an actual source of revenue. It may be doubted, of course, whether this revenue offsets the inconvenience of separate collection and the transportation of the garbage to a single central point as compared with the process of single collection and incineration of all wastes at a number of points in the city.

Isolation of B. Typhosus from Water

Two English workers, Dr. W. J. Wilson and Dr. Charles Dickson, have recently cast new and interesting light on the question of the viability of the typhoid bacillus in water and its isolation therefrom. Working with an ingenious device of their own design they have made successful recoveries when 100 c.c. of the water contained but a single typhoid bacillus, and when other organisms, including colon bacilli, were present in the same amount to the number of 20,000. The method is essentially one of concentration by evaporation at body temperature under reduced pressure, followed by plating on special media. In this manner a sample of four liters is reduced to about 20 c.c. in twenty-four hours, the residue usually being spread on plates containing Fawcus' modification of Conradi's brilliant green picric acid agar. Characteristic colonies are tested with typhoid serum, and those giving positive reactions are subjected to the usual confirmatory tests. Comparing their results with those of other workers using various methods of preliminary enrichment and concentration by filtration and precipitation, these investigators claim, and with apparent justification, that their method is far more delicate and generally useful than any that has been devised as yet. The method certainly seems to bring us materially nearer a trustworthy and certain examination for the typhoid organism, and seems worth a trial in this country.

In their experiments on the longevity of B. typhosus in water, a glazed earthenware vessel, made to imitate an open well, was filled with sixty liters of tap water and infected with feces and urine from typhoid carriers such that it contained 70,000,000 typhoid bacilli and comparable numbers of colon and other organisms. The well was left open to the existing winter weather conditions, and although the temperature of the water varied between 21 degrees F. and 54 degrees F., successful typhoid isolations were made until after the twenty-third day. These results stand out in contrast to Dr. A. C. Houston's inability to recover uncultivated typhoid bacilli from raw river water after one week, and indicate to these authors that his conclusion that "less than a month's storage of raw river water is apparently absolute protection against typhoid fever" should be accepted with reserve.

(*Jour. Roy. San. Inst. XXXII,* 9)

Fecal Contamination of Roller Towels

The bacteriologist to the State Board of Health of Massachusetts, Mr. Henry N. Jones, has undertaken recently the examination of roller towels from a number of toilet rooms, each of which was accessible to a considerable number of persons, in the expectation that the results of such an examination might indicate, in a general way, the types of bacteria likely to be found on public towels, and especially, by demonstrating either the presence or absence of organisms peculiar to the intestinal tract, throw some light on the relative safety in the use of such towels.

Twelve towels were examined. The procedure was as follows: A representative portion of the towel, about one square inch in area, was wiped off with a sterile diphtheria swab, which was then transferred to a tube of sterile physiological salt solution. From this suspension agar plates were poured, incubated at body temperature, and examined after twenty-four and forty-eight hours.

No detailed study of the various saprophytic forms was undertaken, beyond noting their general characteristics and morphology. Particular study was made of any organisms found which might be presumably of fecal origin, such as B. coli. Bacilli of the colon type were identified by their morphology, staining reaction, and the composition of the gas produced in the fermentation of lactose bile.

Some difficulty was experienced in obtaining satisfactory plates, as the universal occurrence of organisms of the subtilis type with their rapidly spreading growth necessitated the use of high dilutions. Furthermore, the proper dilutions to be used in the examination of any particular towel were largely problematical, as the number of living bacteria obtained from the different towels varied enormously.

Following the large spore-bearing organisms of the subtiloid group in point of frequency, and of greater significance, were *staphylococci,* colonies of which were obtained from many of the towels. The presence of these pus-producing organisms would seem to indicate distinctly the possibility that *staphylococci* of high virulence might be transferred from one person to another through the use of the common towel.

Of greater significance, however, was the isolation from three of the towels of the *B. coli,* while from towel No. 5 there was isolated an organism identified as *Proteus vulgaris.* Thus towels Nos. 8, 11 and 12 furnished strong evidence of fecal contamination, and No. 5 was also most probably contaminated in the same manner.

SUMMARY.

A considerable proportion of public roller towels become contaminated with human feces. An unknown number of human "carriers" have typhoid bacilli in their feces. How many cases of typhoid fever are contracted through contact with soiled roller towels?

Monthly Bulletin, Nov., 1911, *State Board of Health of Massachusetts.*

Tuberculosis Among Public School Teachers*

In making a study of the occupational relation to tuberculosis, one cannot help being impressed by the frequent occurrence of tuberculosis among school teachers. A careful study of the following table will give a very comprehensive idea of the situation.

Over a period of years 52.4 per cent. of the deaths among school teachers, between the ages of 25 and 34, were due to tuberculosis, while only 25.8 per cent. of the deaths among all persons in Michigan, between the ages of 25 and 34, were due to this disease. Among school teachers of all ages 27.6 per cent. of the deaths were due to tuberculosis, while among all persons of all ages only 9.4 per cent. were due to this disease.

This is a matter which should engage the active attention, not only of teachers, but of the patrons of the public schools. It would appear from our data that the conditions under which public school teachers labor are conducive to tuberculosis. This is, in a great many instances, an easily established fact. Now, this ought not to be. The school teacher, who should be considered as the most valuable factor in the establishment of an efficient citizenship, should not be required to work under conditions which are relatively more conducive to the occurrence of tuberculosis than other professions.

Extreme precautions should be observed by school commissioners and Boards of Education to prevent teachers who are affected with tuberculosis from continuing in the service. This should be done in the interest of the teacher and in the interest of the pupils. The solution of the situation, however, should not rest simply with the attempt to prevent infected teachers from being employed. The school officials and the patrons of our public schools should be united in effort to remedy the existing conditions, that the public school room can in no sense be considered as a place in which one's health is subjected to unfavorable conditions. A more active interest in considering the principles of proper construction, warming, ventilating and lighting of school buildings will go a great way towards remedying this situation.

**From Public Health, October-December,* 1911, *State Department of Health, Michigan.*

Table showing the proportionate mortality from tuberculosis among school teachers in 1908-1910, *compared with that of all persons in Michigan, from* 1903-1907, *by age groups.*

Age at death	Deaths of school teachers in 1908—1910, due to—		Per cent of all deaths due to tuberculosis among—	
	All causes	Tuberculosis	School teachers, 1908-1910	All persons in Michigan, 1903-1907.
15 to 24 years	87	31	35.6	27.1
25 to 34 years	63	33	52.4	25.8
35 to 44 years	44	10	22.7	16.6
45 to 54 years	24	3	12.5	9.4
55 to 64 years	26	2	7.7	5.1
65 years and over	50	2	4.0	1.5
All ages	294	81	27.6	9.4

A School for Midwives

The following interesting note is taken from the November Bulletin of the Department of Health of New York:

"A school for midwives has recently been established in New York City. This is the first school for midwives in the United States under municipal control. During the summer of 1911, Dr. John Winters Brannan, President of Bellevue and Allied Hospitals, New York, obtained from the city a special appropriation for this purpose, and in July this school was officially opened. It has accommodations for eight patients, with a possibility of expansion within the near future. The present class of midwives numbers eight. Others have entered from time to time but have left the school either because they were not fitted for the work or because they refused to take so long a course. The length of the course has been placed at six months. The midwives live in the building all the time and are allowed to deliver cases under the supervision of the house physician. Three lectures a week are delivered to the midwives by the resident physician. These lectures cover elementary and practical points in the diagnosis of pregnancy, the management of normal labor, the diagnosis of abnormal conditions existing at labor, and the care of the mother and child during the puerperal period. The supervising nurse covers the same subjects from the nursing point of view. These lectures are couched in simple language, and the cases observed by the midwives are used as subjects for description and demonstration. Special attention is directed towards the care of infants, the necessity of breast feeding and the manner and methods of artificial infant feeding. In the school the midwives prepare the meals, are responsible for the neatness and care of the house, and take all care of the patients as well as being in attendance at the confinement. The purpose is to provide a training which will include the housewifely duties, the essential methods of nursing, and professional knowledge essential to the proper care of cases of normal labor. No special requirements for admission are maintained, but the applicant must be able to read and write and must be of good moral character. No charge whatever is made for the course.

While this school is maintained by New York City, the Department of Health, which controls the practice of midwives in the city, under a special state law, has been unable to demand that all midwives shall be trained there, before being allowed to practice, on account of its limited facilities. All women, however, who apply at the department for permits and who have not cared for the requisite twenty cases of childbirth are referred to the school for the necessary instruction. As soon as sufficient provision can be made to provide for the number of midwives in the city, this course preliminary to the granting of a permit to practice will be made compulsory."

Insects and Infantile Paralysis

An interesting and suggestive article by Mr. Charles T. Brues and Dr. Philip A. E. Shepard on the possible etiological relation of certain biting insects to the spread of infantile paralysis appears in the December issue of the Monthly Bulletin of the State Board of Health of Massachusetts.

They enumerate the data which suggests insects as carriers as follows:

"1. The sporadic occurrence of the cases: this is not easily explained on the basis of ordinary contact infection, at least in many instances.

"2. The seasonal distribution of the disease shows the largest incidence during the warmer months, when insects of all sorts are most prevalent.

"3. The failure on the part of investigators to show that the disease spreads most where many children are regularly in close contact. It seems, on the contrary, from reports thus far published, to be the exception rather than the rule for several in a family to contract the disease, even though the number of young children be large.

"4. The comparative immunity from this disease of large cities in which the proportion of biting insects to the human population must be less than in more sparsely settled or in rural districts, while the opportunities for personal contact are at a maximum.

"5. The fact that in the towns of Massachusetts, where the disease has been most prevalent, the proportion of animals to the population is greater than in the cities, where the disease is least prevalent, in itself implies a larger number of biting and parasitic insects which may affect man as well as animals. Furthermore, when we consider the paralyses of animals and their possible relation to human anterior poliomyelitis, the study of biting parasites becomes increasingly interesting and important."

These observers investigated 88 cases occurring in 17 cities as to the presence of biting flies in close proximity to the affected persons. They found, with the exception of mosquitoes, the ordinary biting stable fly (Stomoxys calcitrans L.), to be the only biting insect in the immediate vicinity of the patients.

The following interesting facts concerning some of the cases are given:

"In Woburn, where 14 cases occurred, a paralytic affection of pigs was reported previous to the beginnings of the human disease. In another instance a cat was paralyzed.

"In Lowell, furthermore, in one family a cat became paralyzed coincidently with a child in the same family. Moreover, the cases in Lowell were distributed along the main artery of traffic from the city of Woburn, and situated either on or sufficiently near the main thoroughfare to be within easy flying distance of it. In other words, it is possible that infected flies from Woburn may have followed horses or may have been carried by vehicles from Woburn into Lowell. In point of time Woburn cases occurred first.

"In Somerville one case gave the history that, one month before the attack, the patient was stung between the shoulders by a strange insect, and at the same time an adult member of the same family was bitten in the same way. The sting was accompanied by a sharp pain and was probably due to some species of *Tabanus,* although it may have been that of *Stomoxys* or other biting insect. In two instances in Somerville the fathers of the affected children were teamsters, and in one instance two older boys in the family were also teamsters. The implication is, of course, that teamsters, being in intimate contact with horses, might bring home with them infected biting flies. Furthermore, another home was situated in a narrow court close to the freight yard of the Boston & Maine Railroad. Wickman and others have noted a close relation between anterior poliomyelitis and railroad tracks. It is suggested that the transportation of food-producing animals over the railroad and the constant association with these animals of biting flies, may have an important bearing on the occurrence of this disease. One victim in Attleborough was a freight brakeman.

"In Newton one case occurred on the outskirts of the city, where several cows were reported to have been lame in the hind quarters two weeks before the child was taken sick. The cows were pastured in a field adjoining the house where the patient lived, and frequently escaped into the back yard of this house.

"In a case which occurred in Hamilton the father was a coachman, and thus naturally had much to do with horses and other animals.

"In Fall River, an adult, male, seventy-three years old, gave, unsolicited, a history of bites by stable flies a week or ten days previous to a febrile attack and paralysis of one arm."

The authors summarize their conclusions as follows:

"Nothing absolutely definite has hitherto been ascertained regarding the channels of infection of acute epidemic poliomyelitis.

"Many facts connected with the distribution of cases and the spread of epidemics of this disease, together with histories of insect bites, suggest at least that the disease may be insect-borne.

"From our field work during the present summer, together with a consideration of the epidemiology of the disease, it is suggested that *Stomoxys calcitrans L.* may be responsible for the spread of acute epidemic poliomyelitis. No facts which disprove such hypothesis have as yet been adduced."

Further experiments based on this theory are in progress and will be looked for eagerly, as anything which will indicate the true manner of infection of this dread disease will be a most valuable and needed contribution to sanitary science.

Typhoid Fever Control

Doctors Marshall L. Price, William R. Stokes and C. W. G. Rohrer in a recent issue of the Journal of the American Medical Association (Jan. 20, 1912), give the methods used by them in protecting the two water-sheds of Baltimore from infection with typhoid fever bacilli. The following procedure is carried out with all cases reported:

Special disinfecting outfits are distributed to the homes of the patients by an inspector and full, printed directions for their use are left. The attending physician, nurse or attendant is also furnished with a copy of the instructions.

An inspector carries a "standard package" of disinfecting appliances to the house, unpacks it, makes up solutions and explains their use. Enough disinfectant is left for 4 weeks. After recovery of the patient the inspector removes the appliances, which may be used again.

The outfit consists of: 2 five-gallon buckets, phenol (90%), urinal, enamel basin, corrosive sublimate tablets, bed-pan, enamel measure, lactose bile outfit, mosquito netting canopy.

Directions for the use of the outfit are very full and plain, including instructions to physicians, attendants and inspectors, and a copy of the State law applying to these cases.

When disinfection of stools is about to be discontinued a specimen of the stools is sent in the bile tube provided, to the laboratory, where it is examined for typhoid bacilli. It is required that stools of a convalescent be disinfected until the typhoid bacillus is no longer present.

By this method in 39 examinations the typhoid bacilli were isolated in 11 instances (28%), and paratyphoid organisms in 9 (23%).

It is the authors' belief that negative cultures should be required of typhoid cases just as much as of diphtheria cases.

By careful disinfection and examination until negative cultures are obtained, they believe that the starting point of what might be, otherwise, many cases of typhoid fever can be removed, and that this is the most important source at which to attack the spread of typhoid throughout the community.

Economic Losses Due to Rats

The importance of rats and other rodents in the spread of plague is well recognized by public health officials and is a sufficient argument to warrant officials making special efforts to destroy them, and to do away with their breeding and feeding places. The economic loss due to such animals, particularly in rural districts, is another reason why a vigorous campaign of extermination should be waged. The following from a recent issue of *Farm and Fireside* is of interest in this connection:

"Strange as the statement may at first seem, it is conservative to place the damage done yearly by rodents in the United States at $150,000,000. The economic loss due to such common rodents as rats, mice, ground-squirrels, chipmunks, prairie-dogs, gophers, muskrats, woodchucks and rabbits is astounding. Exact data is, of course, not obtainable. A writer in the *American Agriculturist* once estimated that rats alone caused this country losses of $10,000,000 a year. France loses $40,000,000 annually from rats and mice, according to estimates. Dr. D. E. Lantz, of the Biological Survey, considers this country's losses several times greater. Sir James Crichton-Browne of the English Incorporated Society for the Destruction of Vermin, puts at $73,000,000 per annum the damage done by rats in Great Britain and Ireland, in the rural sections alone. One can only conclude from such figures that an estimate of $150,000,000 for this country is low. According to Dr. C. Hart Merriam, former chief of the Biological Survey, agriculture in this country suffers $10,000,000 a year from the ground-squirrel alone.

"The bulk of this loss falls on the farmer. The rodents do not spare him, despite the fact that he must also contend with insect enemies and plant-diseases. House rats and mice are at home, however, in town and country alike, and everyone, therefore, is concerned in exterminating the rodent population."

VOL. II FEBRUARY, 1912 No. 2

AMERICAN
JOURNAL OF PUBLIC HEALTH

PREVENTION OF INFANT MORTALITY BY BREAST FEEDING

By William H. Davis, M.D.,
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Much has been said from time to time in favor of breast feeding of infants; and statements have been made that 80 or 85 per cent. of infant deaths occur among bottle-fed babies.

But such statements have lacked force because it has not been apparent how many mothers nurse their babies and how many bring them up on the bottle.

If 80 per cent. of infant deaths occur among bottle-fed babies, and if it should be found that 80 per cent. of all babies are bottle fed, then there would be no case at all against bottle feeding.

In order to find out the percentage of babies that are bottle fed, the Boston Board of Health recently sent about 900 letters to mothers who had births recorded within the past year. Care was taken to select proportionate numbers of babies of various age periods, namely, two weeks to one month, one to three months, three to six months, six to nine months, and nine to twelve months, and to select proportionate numbers of babies from the various wards and from the various mother nativities—the number of births in 1910 in the various wards of various mother nativities being taken as the basis for these proportions. Aside from obtaining the proportionate numbers of babies in the way just indicated, care was taken not to select these babies in any way but to take them at random from the birth returns furnished by the Registry Department. The circular sent to each mother was as follows:

"*Dear Madam*:—To assist the Board of Health in its campaign to save the babies of Boston, will you please answer the following questions regarding your child and return this slip at once in the enclosed envelope.

"Is this child breast fed? (Answer yes or no.)
"How long was it breast fed?
"Is this child bottle fed? (Answer yes or no.)
"How long has it been bottle fed?
"If bottle fed, what food has been used?"

Read before the Massachusetts Association of Boards of Health, January 25, 1912.

Replies were received promptly from over half of the mothers addressed, and an additional 200 replies were obtained through the Board of Health nurses, who went to the homes for the information.

Table I gives the results of this investigation—the number of replies received for babies of various ages and mother nativities and the percentages of breast and bottle fed babies.

TABLE I.

LIVING BABIES --BREAST OR BOTTLE FED.

TOTAL REPLIES.

Mother Nativity.	2 weeks to 1 year	2 weeks to 1 year		2 weeks to 1 month.		1 to 3 months		3 to 6 months		6 to 9 months		9 to 12 months		Percentage breast fed
		Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	
United States,	272	174	98	44	8	33	23	42	19	24	29	31	19	64
Ireland,	120	93	27	17	1	24	6	23	8	16	5	13	7	77
England, Scotland and Wales,	20	15	5	1		3	1	4	1	3	2	4	1	—
Germany,	2	1	1					1	1					—
Canada,	69	38	31	5	1	8	7	8	9	8	8	9	6	55
Scandinavia,	10	8	2	1		1	1	2		3	1	1		—
Italy,	123	106	17	24	2	23	4	23	2	18	2	18	7	86
Russia and Poland	120	98	22	20	2	21	7	21	6	17	6	19	1	82
Totals,	736	533	203	112	14	113	49	124	46	89	53	95	41	72
Percentages,		72	28	89	11	70	30	73	27	63	37	70	30	

The number of replies was 736, of which 533, or 72.4 per cent., were breast fed and 203, or 27.6 per cent., were bottle fed. But the information thus obtained is only for living children. To determine what proportion of all babies are bottle or breast fed, it is necessary to add a proportionate number of the deaths of 1911. These necessary additions are given in Table II. Adding the figures in each square of Table II to the figures in the corresponding square of Table I, totals may be obtained which show the relative proportions of breast and bottle-fed babies in Boston. The corrected percentages shown in Table II were thus obtained. At various places in the table there appear higher percentages of breast feeding for the older babies than for the younger. This, of course, is an error due to too few replies and would be rectified if answers from all the mothers of 1911 could be tabulated. But the evidence furnished by these 736 replies is very striking and may be used for present calculations.

TABLE II.

DEATH ADDITIONS TO TABLE I NECESSARY TO OBTAIN CORRECTED PERCENTAGES OF BREAST AND BOTTLE-FED BABIES.

Mother Nativity.	2 weeks to 1 year.		2 weeks to 1 month		1 to 3 months		3 to 6 months		6 to 9 months		9 to 12 months	
	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle
United States,	5	27	1	3	1	9	1	7	1	4	1	4
Ireland,	3	9		1	1	2	1	2		2	1	2
England, Scotland and Wales	1	1					1	1				
Canada,	2	7		1	1	2	1	2		2		
Scandinavia,		1				1						
Italy,	6	6	1	1	1	1	1	1	2	2	1	1
Russia and Poland,	3	5	1		1	1		2	1	1		1
Totals,	20	56	3	6	5	16	5	15	4	11	3	8

CORRECTED PERCENTAGES FOR THE VARIOUS AGE PERIODS.

	2 weeks to 1 year		2 weeks to 1 month		1 to 3 months		3 to 6 months		6 to 9 months		9 to 12 months	
	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle
Percentage,	68	32	85	15	64	36	68	32	59	41	67	33

CORRECTED PERCENTAGES OF BREAST-FED INFANTS OF VARIOUS MOTHER NATIVITIES.

Children of mothers born in the United States,	59
" " " " " Ireland,	73
" " " " " Canada,	51
" " " " " Italy,	83
" " " " " Russia and Poland,	79

Italy leads, with 83 per cent. breast fed; Russia and Poland come next, with 79 per cent. breast fed; Ireland and the United States follow, with 73 per cent. and 59 per cent., respectively; while Canada makes the poorest showing, with only 51 per cent. breast fed. The replies from mothers born in England, Scotland and Wales, Germany and Scandinavia, were too few to warrant any estimate for the babies of these mother nativities.

Table III gives for 1911 the total mortality of infants by age, by mother nativity and by feeding (for infants over two weeks of age).

Table IV gives for 1911 the total mortality of infants by month, by age and by feeding (for infants over two weeks of age).

TABLE III.

1911 MORTALITY OF INFANTS BY AGE, BY MOTHER NATIVITY AND BY FEEDING (FOR INFANTS OVER TWO WEEKS OF AGE.)

	TOTAL DEATHS															Per cent. of deaths 2 weeks to 1 year breast fed
Mother nativity.	Total deaths under 1 year	2 weeks to 1 year.		2 weeks to 1 month		1 to 3 months		3 to 6 months		6 to 9 months		9 to 12 months		
		Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	
United States,	927	106	544	26	58	20	172	31	144	15	93	14	77	16
Ireland,	345	48	179	7	20	16	47	8	53	8	29	9	30	21
England, Scotland and Wales,	61	13	25	1	2	4	6	5	10	1	4	2	3	34
Germany,	12	3	6	1			2		1	1		1	3	33
Canada,	232	32	128	5	10	7	40	7	33	7	35	6	10	20
Scandinavia,	30	5	15		3	2	4	3	4		3		1	25
Italy,	292	124	112	13	13	26	21	21	27	37	32	27	19	53
Russia and Poland,	230	60	101	11	8	17	21	11	29	13	23	8	20	37
Other countries,	87	21	51		1	6	12	5	10	6	18	4	10	29
Unknown,	29	1	25		1		13	1	3		3		5	4
Totals,	2,245	413	1,186	64	116	98	338	92	314	88	240	71	178	26
Percentages,		26	74	36	64	22	78	23	77	27	73	29	71	

Note: There were four deaths over two weeks where method of feeding was not known.

TABLE IV.

1911 MORTALITY OF INFANTS BY MONTH, BY AGE AND BY FEEDING (FOR INFANTS OVER TWO WEEKS OF AGE.)

	TOTAL DEATHS.													
Month	Total Deaths under 1 year	2 weeks to 1 year		2 weeks to 1 month		1 to 3 months		3 to 6 months		6 to 9 months		9 to 12 months	
		Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle	Breast	Bottle
January,	162	34	64	7	6	10	21	8	20	5	9	4	8
February,	175	49	65	8	5	13	17	7	16	13	13	8	14
March,	196	41	101	10	8	11	35	7	22	9	27	4	9
April,	191	38	102	8	10	9	28	10	23	7	22	4	19
May,	181	34	85	7	15	4	22	11	20	5	13	7	15
June,	129	21	61	4	8	6	19	3	10	6	14	2	10
July,	280	39	184	3	10	8	46	10	46	10	49	8	33
August,	260	40	181	5	14	6	40	12	64	8	38	9	25
September,	224	40	137	2	16	7	39	10	39	10	23	11	20
October,	172	26	86	1	5	9	27	6	28	3	13	7	13
November,	138	24	62	3	9	9	24	3	12	5	10	4	7
December,	137	27	58	6	10	6	20	5	14	7	9	3	5
Totals,	2,245	413	1,186	64	116	98	338	92	314	88	240	71	178

Notice in Table IV that there is only a slight increase of deaths among breast-fed babies during the summer months. July, August and September, with 39 and 40 such deaths each month, are lower than February, March and

April with 49, 41 and 38 deaths, respectively. The number of deaths among bottle-fed babies, however, jumps up tremendously in July, August and September.

Table III shows that only 26 per cent. of infant deaths between the ages of two weeks and one year occur among breast-fed babies. And of infants over two weeks old, born of native mothers, only 16 per cent. of the deaths occur among breast-fed children; while of babies over two weeks of Italian mothers, 53 per cent. of the deaths occur among breast-fed children.

Bottle-fed babies between the ages of one and three months show the highest mortality, especially those babies having mothers born in the United States.

Interesting and instructive as the foregoing figures and rates may be, ten times more interesting and instructive are the estimates which can be obtained from those tables. Many such estimates are tabulated in Table V.

If 74 per cent. of infant deaths above the age of two weeks are among bottle-fed babies and only 32 per cent. of babies over two weeks are bottle fed, then the bottle-fed infant over two weeks old is six times as likely to die as the breast-fed infant.

Again, if all the infants above the age of two weeks had been breast fed, or equally well fed (for it is by no means proven that bottle feeding may not be so safeguarded that the mortality will be no greater than among breast-fed babies), there would have been only 1,253 infant deaths last year, while if all had been bottle fed there would have been 4,352 such deaths.

The actual number of infant deaths last year was 2,245, which gives a rate of 127 per thousand births.

Breast feeding of all babies would have saved nearly a thousand lives last year, and the death rate per 1,000 births would have been 71 instead of 127.

TABLE V.

ACTUAL DEATH-RATES AND ESTIMATED DEATH-RATES IF ALL CHILDREN HAD BEEN BREAST FED.

	Mother Nativity					
	United States	Ireland	Canada	Italy	Russia and Poland	Totals for Boston
Births, 1910,	6,226	2,816	1,747	2,703	2,479	17,668
Deaths under one year, 1911,	927	345	232	292	230	2.245
Rate per 1,000 births (using the 1910 births),	149	123	133	108	93	127
Percentage of children between two weeks and one year, breast fed (estimated),	59	73	51	83	79	68
Deaths, 1911, of children between two weeks and one year,	653	227	160	236	162	1,603
Percentage of deaths between two weeks and one year, breast fed,	16	21	20	53	37	26
Estimated total infant deaths, 1911, if all above age of two weeks, had been breast fed,	457	184	135	205	145	1,253
Lives saved if all above age of two weeks had been breast fed,	470	161	97	87	85	992
Estimated death-rate if all above two weeks had been breast fed,	73	65	77	76	58	71
Estimated reduction in death-rate if all above two weeks had been breast fed.	76	58	56	32	35	56

There would have been 470 less deaths among the children of native mothers; 161 less deaths among the children of Irish mothers; 97 less deaths among the children of Canadian mothers; 87 less deaths among the children of Italian mothers; and 85 less deaths among the children having mothers born in Russia and Poland.

A large part of this saving of infant life is to be expected in the great reduction of deaths from diarrhea and enteritis. Of 621 deaths from diarrhea and enteritis last year between the ages of two weeks and one year, 87 were breast fed and 534 bottle fed; i. e., 86 per cent. were bottle fed. If all the babies had been breast fed the estimated number of these deaths would have been 493 less than actually occurred.

These figures are so startling that I feel that this investigation ought to be continued till 5,000 or 10,000 replies have been received from mothers, so that no opportunity be given to criticise the figures on the score of paucity of data.

These estimated rates measure the possible reduction in infant mortality if all babies could be breast fed, and they also show in what nationalities most of the improvement is to be expected.

Such a saving of infant life is not a mere fancy. The reduction of the infant mortality rate from 127 to 71 is entirely within the range of possibilities.

New Zealand in 1909 had a rate of 62 and South Australia for the same year had a rate of 61.

Discussion.

Dr. CHAPIN. It is a great pleasure to have a paper like this presented here showing such interesting facts in such a clear and impressive way. We have had data of this kind from Berlin, London and other places, but to have them from a place right here will better carry conviction to the public. We all realize, I think, from these figures, as we have to some extent before, the great advantage of breast feeding. How to secure more breast feeding has been the great problem. In conversation with nurses in Providence it has developed that it is their opinion that a good deal of bottle feeding is due to the fact that the mothers do not know how to conserve the breast milk. We have, in order to assist mothers in this respect, prepared a circular explaining the best way of securing a good secretion of breast milk and maintaining it, and that circular has been used very largely by the nurses in instructing the mothers. But it is certainly a great help to us to have home figures with which to back up our arguments.

THE CHEMICAL DISINFECTION OF SEWAGE

Earle B. Phelps,

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Before an association of public health officials it will be unnecessary for me to dwell at any length upon the eminent desirability of some kind of sewage disinfection. Sewage, representing as it does, the wastes of modern community life, is the very embodiment of the idea of uncleanness and of unwholesomeness. It may contain at any time highly infectious material, and probably does at all times carry germs capable of setting up abnormal processes in human beings. In earliest historical times these facts were recognized and provision for the proper disposal of excrement was accordingly made. Some time after the advent of sewers, the real problem of sewage disposal made itself felt, and early attempts at sewage purification were made with the primary idea of destroying in the sewage its power to communicate disease—that is, to disinfect it.

One of the most successful of these attempts was the sand filter, a device which needs no introduction before a Massachusetts audience. This state is the home of the sand filter, and through the activities of the State Board of Health, extending back over the past twenty-four years or more, it has been brought to its present high degree of efficiency. The sand filter did its work well and could be relied upon to remove a very large percentage of the sewage bacteria. In addition to this it purified the sewage so thoroughly that in appearance, in taste, and in all other ways by which one ordinarily judges, a pure drinking water resulted.

Unfortunately the use of this excellent device is limited to those smaller communities which are situated near natural sand areas. Cities of the Middle West and of many other parts of this country have for the most part no such good fortune as is ours in Massachusetts. Even here the necessary land cannot always be found, and it is becoming more and more difficult each year to find suitable sand areas in the neighborhood of the cities. Where, for example, could Boston find the thousand or more acres of sandy soil which would be required for the treatment of the sewage of the city proper? The limitations of this process have led investigators in many countries to seek improved methods of purification requiring smaller areas of land. Particularly in England has this been the case, and there have resulted two processes known respectively as the contact bed and the trickling filter. It will be unnecessary to go into the details of these processes at this time further than to state that a modern trickling filter treats sewage at a rate twenty or more times as great as the permissible rate of the old sand filter. The results, however, are far less perfect, and especially in the matter of removal of bacteria these rapid filters leave much to be desired. Sewage purification in fact and especially up to a few years ago, had come to be looked upon as a means of depriving sewage of its offensive characteristics, of its tendency to putrefy, but not of its bacteria. This is a somewhat debatable point and there may be some exception taken to such a state-

Read before the Massachusetts Association of Boards of Health, January 25, 1912.

ment, but it is the writer's belief, founded upon somewhat extensive observation and experiment, that a fifty or sixty per cent. removal of bacteria is about all that can be obtained in actual practice by a trickling filter, working under practical conditions upon the sewage of a city.

This half-way measure, judged from a bacterial standpoint, has been forced upon us by the necessities of the situation, and, were it not for the possibilities of chemical disinfection, the purification of sewage by the only practical means available for our larger communities would not constitute a material improvement in stream conditions, viewed solely now from a bacterial and sanitary standpoint.

A further and still more important reason, however, for taking up the study of chemical disinfection, results from the common practice of discharging sewage into rivers or other bodies of water without treatment. However, as sanitarians, we may deprecate such practices, and however earnestly we may labor to make better conditions possible and, in consequence, enforcible, the fact remains that biological sewage purification with all the advances of the past decade is still beyond the reach of most large cities. The reason for this is not so much the expense involved as the great difficulty in securing proper locations for disposal works. It happens, fortunately, that the large centers of population are generally located upon large rivers or upon the seaboard, where there is water enough to dilute the sewage so that no obvious physical nuisance results. There remains, then, only the danger incident to the discharge of disease germs, with a possibility that these germs may reach public water supplies, shell-fish areas, or bathing beaches, or otherwise become a source of infection.

The Merrimac River will serve as an excellent illustration. The sewage of Lowell, the largest city on the river, is discharged without any attempt at purification into the water supply of Lawrence, the next largest city, and Lawrence and the cities below, in their turn, discharge their untreated sewage into the same stream. At the mouth of this river is located one of the largest and most productive soft clam areas of the state, an area from which clams are taken throughout the year for shipment to many parts of this country.

The physical capacity of the waters of this river to receive and dispose of sewage without nuisance, although utilized to about its natural limit, has thus far proven sufficient or nearly sufficient for the burden thrown upon it. Fortunately, also, Lawrence filters this water before drinking it. But the margin here is too narrow. Instances are not lacking in this and similar cases where deaths have resulted from a failure of the water filter to properly perform its task. Moreover, no similar safeguard can be thrown about the shell-fish industry. A recent study of the situation, undertaken on behalf of certain Boston wholesale dealers, convinced the writer that clams from these areas were probably unsuited for human consumption, and could not be used by these dealers in their interstate business without incurring the danger of federal seizure and prosecution, in which event no successful defense could be maintained.

This example is merely cited as an illustration of the desirability of sewage purification in general, and of disinfection or the destruction of germs in particular; and the whole subject of the desirability of disinfection has been considered rather extensively because, with our present simple methods of procedure, it is more difficult to determine when disinfection is called for than it is to say how it may be accomplished.

Turning now to the methods of disinfection, one finds a history that is varied and interesting. Long before the general acceptance of the germ theory of disease, chemical methods of sewage purification were recommended and used. Deodorization and the prevention of offensive putrefaction, believed at that time to be disease producing, were the purposes chiefly in view.

Later, in 1889, the Webster electrolytic process was proposed, primarily as a means of clarifying sewage. It was pointed out incidentally, however, that a great reduction of bacteria took place. After this came many electrolytic processes in which either the sewage itself was electrolyzed between plates of iron, or sea water was thus treated and later added to the sewage. In Germany, the use of hypochlorites was proposed as an emergency measure at times of epidemics, but German experiments, as well as those made later by Rideal at Guilford, England, indicated excessive costs, a feature which has always been a barrier to the introduction of chemical disinfection methods.

This was the condition of affairs when investigations were begun at the Institute of Technology Experiment Station, in the Spring of 1896. Recognition of a rather curious fact in bacteriology contributed to the final successful outcome. It was known to bacteriologists that in any process of killing bacteria, whether it be by heat, cold, chemical action, or other unfavorable conditions, the bacteria do not all die at once. They behave much as soldiers would if exposed in a body to a disastrous artillery fire. The mortality at first is great. Then it becomes less and less as the number of living decreases. The percentage mortality is as great up to the end if the marksmanship is equally good, but the actual death rate becomes smaller. Obviously now, if the enemy wished to conserve his powder and lead there would come a time when it would not pay to continue the firing for the sake of bringing down the few survivors. Chemical disinfection is exactly parallel. To kill all the bacteria requires very strong doses of disinfectant and long time of contact. To kill 99% of them might require half as much or one-third as much and corresponding shorter time. The practical question before us was, therefore, not how much disinfectant is required to kill *all* the bacteria, but how great a result can be achieved by the use of quantities which we can afford to employ. Perfection, however desirable, is hard to attain. How nearly can we reach it without making the process so costly that it will be impracticable?

Several disinfectants suggested themselves for trial and a thorough review of the whole subject was undertaken. The details of this investigation have all been published elsewhere, and it will be unnecessary to burden these pages with them. Suffice it to say, that the question came down to two classes of disinfectants—copper compounds and chlorine compounds. The one, a poisonous metal, acts like mercury and other heavy metals; the other, an oxidizing agent, is the active constituent of ordinary chloride of lime or bleaching powder. Of these two, the chlorine compounds proved themselves by far the more efficient, and of the several forms of chlorine, ordinary chloride of lime—more properly hypochlorite of calcium—produces better results for the money than any other.

The amount necessary varies greatly with the character of the sewage or effluent. The stronger the sewage, the greater the amount required. Crude Boston sewage requires on the average about five parts per million of available chlorine, or 125 pounds of bleaching powder per million gallons for a bacterial reduction of 99%. Twice this amount gives a reduction of 99.9%, which illustrates the mortality law described, or the increasing difficulty of killing the few remaining bacteria. Filter effluents of the kind described earlier in this paper, the trickling filter effluents, require for the same degree of disinfection, two or three parts of chlorine per million; that is, 50 to 75 pounds of hypochlorite per million gallons.

Without describing the necessary engineering structure for adding and mixing the disinfectant and for storing the sewage during the short time required for the action to proceed, it is sufficient to state here that they are relatively inexpensive and require comparatively little space. The disinfectant is added in solution, at a rate which is proportioned to the flow of sewage and the sewage effluent is then passed through tanks which hold it for from half an hour to two hours, according to circumstances.

One further detail of these investigations calls for comment. These bacteria which we enumerate in routine examination are of course for the most part harmless. There are thousands of them in every drop of sewage, and the pathogens, the real agents of disease, are so comparatively rare in this motley throng, that we cannot pick them out with any degree of certainty. It might easily be argued therefore that there is no evidence thus far that the pathogens are killed at all. May they not be the one per cent. of survivors? If so, our work would be of no avail; disinfection would not disinfect. This is a hard problem to solve as is readily seen. It was attacked in this way. In all our tests, in addition to the regular enumeration of bacteria, we determined separately the numbers of the bacillus coli, the common inhabitant of the human intestine. This organism, like the others, is harmless but it gave us something to tie to. The colon bacillus was killed at about the same rate as the others; a little more completely if anything. Next we took a pure culture of this organism in water, and side by side with this a similar pure culture of the typhoid germ. These two cultures were treated with a series of varying strengths of the hypochlorite and the death rates determined under a wide range of conditions. The results were practically identical in the two cases and showed that the coli results may be accepted as safe criteria of the typhoid results.

Turning now from experiment to experience, what have been the results? Some of the original experiments were made at Baltimore for the Baltimore Sewerage Commission. At Baltimore the sewage of the great system that is now nearing completion will be purified to the highest practicable degree for the sake of the valuable oyster industry. There it was proposed to install trickling filters and follow these by sand filters. Disinfection was later substituted for the sand filters in the plans of a saving in initial cost of about a million dollars and in annual operation of over twenty-five thousand dollars. This system is now approaching completion, and while it is thought possible that no after-treatment may be required, the simplicity of chemical disinfection makes it possible to install it at short notice, and it will be installed if it is found necessary.

In New Jersey the State Board of Health took an active interest in the process from the start and aided in the preliminary experiments at Red Bank, New Jersey. Disinfection is strongly advised by that Board and in many places where drinking-water streams or shellfish interests are at stake, insisted upon. There are at present five or six plants in operation there, others are being designed, and still others have provision made for disinfection if it should prove desirable.

The most important installation of this type, however, is at Providence, R. I., where twenty million gallons of sewage a day are being disinfected with most satisfactory results. Examinations of the oysterbeds this Fall, previous to certification by the State Commission of Shell-Fisheries, showed that many acres of beds that were condemned a year ago can now be certified under the rigid standards of that Commission and that the dead line for oysters has moved a long way up the Upper Narragansett Bay, a result due without doubt to the disinfection treatment.

Lastly, an interesting and far-reaching effect has been the application of this process to water. It was stated that the purer the sewage or effluent, the less hypochlorite would be required. This principle has been extended with greatest success to the field of water purification. Veritable homeopathic doses are sufficient in this case and several hundred American cities, including the two chief cities of Canada, are now regularly using disinfected water. As an emergency means for rapidly controlling typhoid fever epidemics it has on many occasions proved of greatest value. We have at the Institute an emergency outfit by means of which, within twenty-four hours, any small water supply can be properly disinfected and all danger from typhoid fever eliminated as far as the water supply is concerned.

Chemical disinfection of both water and sewage has thus justified itself both experimentally and practically. It was said two years ago by an eminent and disinterested authority that a new epoch had been begun in both these fields. Subsequent developments have proved the correctness of this prophecy. It is now possible to raise a new and exceedingly effective barrier between the wastes of one community and the food and water supplies of another. The adequacy of this barrier is proven. Its usefulness depends upon the extent to which it shall be employed and this in turn rests with those who are officially charged with the protection of the public health.

If, by the results of these investigations, which have been but briefly recounted here, the use of our streams for carrying off the unpurified filth of cities, is made a little more reprehensible because a little less excusable, then the time, the money, and the effort that they have entailed will not have been spent in vain.

Sanitary Research Laboratory, Mass. Inst. Tech., Boston, Mass. Submitted for Publication, Feb. 1, 1912. [illegible] of this paper will be found on page 81.)

THE SANITARY REGULATION OF THE OYSTER INDUSTRY.

Frederic P. Gorham,
Brown University.

There are two distinct questions involved in any attempt to regulate the sanitary quality of shellfish. First, the question of protection of the public against shellfish which are actually dangerous, that is, those which may contain disease germs and therefore may be the cause of the spread of disease; and second, the question of the protection of the public against shellfish which are merely dirty, which, in the language of the United States Pure Food ruling, consist "in whole or in part of a filthy, decomposed or putrid animal or vegetable substance," which is interpreted as meaning shellfish taken from water which contains sewage material even though this material has been so diluted or disinfected that it carries no disease-producing organisms.

I believe that we should separate these two ideas in our minds very clearly. For I am sure that we are all of the same mind in regard to the first question, but in regard to the second, we may differ in our interpretation of what is meant by "dirty." And when it comes to the enactment of laws which shall properly regulate these matters we should certainly consider the distinction between *dangerous* and *dirty*. For what is dangerous should certainly be prohibited, but where between the different degrees of dirtiness shall we draw the line showing which should be used as food and which should not?

In regard to the first of these questions, the protection of the public health, we have some accurate scientific data on which to base our opinions. Let me briefly review them.

Many shellfish, oysters in particular, are often eaten raw. These shellfish are sometimes taken from sewage-polluted waters and contain therefore the organisms which are present in sewage. These organisms may in certain cases be pathogenic. As long ago as 1880 it was suspected that shellfish might occasionally be the cause of epidemics of typhoid fever. Observations have been continued since then and now we have on record several well-authenticated cases where typhoid fever epidemics have been traced to the eating of raw polluted shellfish.

But we must consider all the facts in these cases and be perfectly fair in our conclusions. We must not condemn altogether the eating of raw shellfish, thus denying ourselves the enjoyment of a most delectable delicacy, and at the same time doing damage to a very large industry, until all the evidence is in. For as far as our knowledge goes at present no epidemics thus far studied have been due to eating shellfish *grown* in polluted waters, but in every case to eating shellfish removed from their growing beds and *"floated," "fattened"* or *"freshened"* in polluted waters. The reason for this is apparent at once. Beds on which oysters are grown are rarely situated directly at the mouths of sewers. While the presence of a little sewage in the water may hasten the growth of oysters, any considerable amount of it exhausts the oxygen, deposits a smothering mud

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Read before the Massachusetts Association of Boards of Health, January 25, 1912.

upon the bottom, and makes it impossible for oysters to live. The typhoid organism is not an hardy one. It probably lives but a short time under the unfavorable conditions found in sea-water. Those that do survive are so diluted in the enormous amount of water ebbing and flowing with the tides, that few if any of them reach the oyster beds. And if a few should reach the oysters I have an idea that they would be digested and destroyed by the feeding apparatus of the oyster himself long before such oysters reach the market.

We have evidence which bears on this point in the City of Providence. The "floating" of oysters is not practiced in Rhode Island, and all oysters come directly from the growing beds. Until last winter there was nothing to prevent the use of oysters from beds in the upper part of Narragansett Bay and from the Providence River, which were badly polluted with sewage. Yet in 1910 Dr. Chapin wrote in regard to Providence: "raw oysters are very popular; they are consumed in restaurants in large numbers, and form a course in a large proportion of banquets and dinners. Many oysters are grown in the upper part of the bay in water grossly polluted with sewage and in the water and in the oysters colon bacilli are found. Yet Providence has a typhoid death-rate less than half that of the average American city. Oysters are not eaten to any extent in August when typhoid fever begins to increase and they are largely consumed in winter and spring when there is little of the disease. Very few oysters are eaten by laboring people, but at present laboring people furnish fully their share of typhoid fever."

Taking these facts altogether, then, it seems to me that there is no evidence whatever that oysters taken directly from their growing beds, even though these beds may be polluted by sewage to a certain extent, have ever caused disease.

But we cannot say the same of "floated" oysters. It is to them that the finger of suspicion points. For here we have very different conditions. Here we find instances where oysters have been placed directly at the mouths of typhoid-laden sewers or in typhoid-laden creeks for hours just previous to sale. No better scheme for the direct infection of such shellfish could be found unless the germs were inserted directly between the shells.

As to whether or not the practice of floating in itself is a proper one is a subject which has been hotly discussed for some time. But in regard to floating in polluted water there can certainly be no difference of opinion.

The arguments usually advanced in favor of floating are that it removes the grit and mud and slime from the interior of the oysters and improves their flavor and keeping qualities. Those advocating the practice usually fail to add also that it bloats and swells the meats by the absorption of a large amount of water which can then be sold at the price of oysters. It has been said that the profit from this increase in bulk is often sufficient to pay all expenses of opening the oysters. From this standpoint then floating constitutes fraud and adulteration under the Pure Food and Drugs Act. Those who are unbiased in their opinion all agree that the only real advantage gained by floating is the cleansing from mud and slime, and this can be accomplished just as well by holding the oysters in clean salt water for a while. The fact that it is practically impossible to find any stream of fresh water which is free from all pollution should deter any conscientious oyster grower from carrying on this practice. That floating is indeed dangerous and accomplishes nothing in the improvement of the stock is recognized by the Pure Food Board because they are at present considering the withdrawal of their sanction of the practice in any form and prohibiting it altogether.

I think you will all agree with me then in answering the first question, when I say that as far as the public health is concerned, for the present at least, all that is necessary is to prohibit this practice of floating oysters. Until further evidence is produced oysters taken directly from the beds on which they are cultivated may be considered safe in practically all cases.

Investigations have not been carried far enough as yet to say whether the same applies to clams, quahogs, and mussels or to the natural set of oysters which are occasionally found in small quantities in heavily and directly polluted waters.

This brings us to a consideration of the second question. How much sewage pollution, not in itself dangerous, but merely dirty, shall we permit in our oysters or other shellfish before we prohibit their sale? This opens up the whole matter of standards of purity. Think of the years of discussion on this subject in our studies of water supplies. Shall colon bacilli in 1 cubic centimeter, 10 cubic centimeters, or 100 cubic centiemters condemn water? It was only when the sanitary survey came to our rescue that we were able to answer this question satisfactorily. We are at present trying to work out standards in our milk analyses. Shall it be 500,000 bacteria per cubic centimeter, 100,000 per cubic centimeter or 10,000 per cubic centimeter? The conditions which enter into the shellfish question are just as complicated as in water and in milk. Before satisfactory laws can be passed regulating the industry much more light must be thrown on the subject than we have at present.

At first the Pure Food and Drug Board adopted the practice of condemning a lot of oysters if three out of five examined showed colon bacilli in one-tenth of a cubic centimeter of the shell liquor. We in Rhode Island followed their lead, and under the law passed at the January session, 1910, we passed or condemned oyster beds in Narragansett Bay by this standard. This gave us results which coincided with the conditions shown by the sanitary survey.

The examination of beds was made in the summer so that the certificates could be issued at the opening of the oyster season in the fall. But on examining some of these beds again later in the winter it was found that if this same standard was used every bed in Narragansett Bay and Providence River would easily pass inspection. Indeed beds in immediate proximity to sewer outlets showed the absence of colon bacilli in all five oysters examined even in cubic centimeter amounts of the shell liquor, a far better result than that given by oysters from far down the Bay, beyond all sources of immediate pollution during the summer.

Obviously the same standard could not be used in winter as in summer, and the question immediately arose ought we to prohibit the use of oysters when they come from near a sewer outlet when analyses show them to be as free from the colon bacillus as many of our best drinking waters? Simply because they are in polluted water should they be condemned though analysis shows them to be better than what we consider the best oysters in the summer? Under such conditions our sanitary survey fails us. We have no standard by which to judge the purity of such shellfish. We are at a loss as how to proceed. Must we have a separate standard for summer and winter?

Of course in a measure we have this now, for no very considerable quantity of oysters is marketed at present in the warmer weather. The old idea as to the oysters being fit to eat only in the R months seems in a way to be borne out by this observation of seasonal variation in the bacterial content.

Almost the same question has arisen in regard to the use of oysters grown in waters into which disinfected sewage is discharged. Disinfected sewage is not dangerous but is it dirty? Ought such oysters to be used for human food?

I believe that the only satisfactory way to handle this matter is to adopt a certain distance from discharging sewers within which it shall be unlawful to take shellfish for food.

These are some of the problems which are troubling us at present. But while we are working at them a very considerable amount of good has already been accomplished in the improvement of the industry along sanitary lines.

In the first place we have seen placed on the statute books of the State of Rhode Island laws which regulate the industry and protect it. Pollution of the waters of the State in which shellfish are grown is prohibited under severe penalty. The State Shellfish Commission must make examinations of and issue sanitary certificates for any bed on which oysters are grown for consumption as food before such oysters can be taken from the beds and sold.

The Commissioners are required to inspect all opening and packing houses and the methods in use therein and must issue certificates as to their sanitary condition before shellfish can be sold therefrom. They are also given the power to make any regulations concerning the construction and operation of such oyster houses as they may see fit in order to place them in proper sanitary condition.

As a result of such legislation we have been able to make a series of analyses of oysters from all the beds in Narragansett Bay and its tributaries at different seasons; also chemical and bacteriological analyses of the water at the surface, at the bottom, and of the mud at the bottom of a considerable portion of the Bay; a study of the tides, currents, temperatures, and densities of these waters; and a complete sanitary survey showing every sewer outlet, every source of pollution entering the waters of the Bay.

In addition to this, the oystermen have been awakened to the seriousness of the matter. Because of the activities of the United States authorities and those of the State, they have been forced to examine into their methods of conducting business and to make every effort to improve their methods along sanitary lines. They have co-operated nobly in the matter and have helped to bring about a complete revolution in their business, which has in many cases involved changes from methods which were as old as the industry itself.

But best of all has been the effect this campaign for clean shellfish has had upon the entire removal of some of the sources of pollution from the tidewaters of the State. Ultimately, of course, this is the goal which we seek, the return of our bays and streams to their earlier condition of purity. It may be a long time indeed before this can be accomplished, but we are glad to record that a beginning has been made.

The Commissioners of Shellfish summoned before them the parties interested in sewage disposal in the several cities and towns which were using Narragansett Bay as a common sewer. At this hearing they were required to tell what efforts they were making to comply with the law which prohibited the pollution of the tidewaters. They were informed that they must take steps immediately to remedy the conditions. As a result already some of them have moved in the matter. The City of Providence is already conducting an investigation of its methods of sewage disposal and has begun the disinfection of its effluent. Other towns are doing something. Much remains to be done. Rhode Island even has a bone to pick with Massachusetts, for there seems to be some interstate traffic in sewage which we hope in time to see remedied.

In conclusion, then, were I asked along what lines at present can we best effect improvement of the shellfish industry I would say:

1. Prohibition of the practice of floating oysters.
2. Prohibition of the use for food of shellfish taken from waters directly polluted with sewage, that is, within a certain distance of discharging sewers.
3. Careful sanitary regulation and supervision of the methods of handling and packing shellfish.
4. Efforts to secure the removal of sewage pollution from the tidewaters where shellfish are grown, or at least the disinfection of all sewage effluents which enter tidewater.

Discussion.

Prof. WHIPPLE. The subject of oyster sanitation is a most interesting one and it may interest you to know that a committee has been studying the subject, in the American Public Health Association, for the past year or two. A preliminary report was made at Havana a few weeks ago and this will be published in due time. (This Journal, January, 1912.—Ed.)

What Prof. Gorham has said in regard to the winter conditions of oysters seems to be true not only of oysters in the Providence River but also of oysters found in this country farther south. During the winter season the bacteriological analyses of all oysters seem to be better than during the summer season. It looks as if the oyster was a more intelligent being than we have given him credit for, because, knowing that we appreciate his society only in the winter, he apparently takes particular care to protect himself against sewage and other filth during this season in order that he may not do us damage or injure his own reputation. I have sometimes wondered why, if that is the case, it is necessary to go to the expense of disinfecting sewage in the way that Prof. Phelps has outlined. If the oyster protects himself why is it necessary to spend money to further protect him? In reply, there is this to be said,—that the oyster is no Pharisee. Neither during the winter, nor at any time, does he attempt to keep clean the outside of his shell and there is a real danger at all times that polluted mud that has not been thoroughly washed off may get into the half shell in which the oyster is served. Many oysters have a small cavity near the hinge which is difficult to clean and which is often filled with mud when served. If this mud gets into the bowl, as it may easily do, there is a danger that it may also get into one's mouth.

Then of course there is the further question of general cleanliness. No one desires to eat food that is unclean. Our committee is trying hard to devise some practical standard which can be applied to bring this about. Prof. Gorham has marked out some of the ways in which this can be done. One other method has been suggested and the committee is working along this idea at the present time and will doubtless report upon it later, viz., a method of "scoring" the oyster beds and the oyster houses, very much as milk farms are now scored. By this method some appropriate authority would give a good score to the oysterman who raises oysters on clean grounds and who harvests and markets his oysters in a clean way, and a low score to the man who is careless in handling his goods and grows his oysters very near a sewer.

I think the whole question of the sanitation of the oyster is one that is rapidly clearing itself up. To some it may seem to be growing more and more complicated, but now that the oystermen are co-operating with the sanitarians we are learning many facts hitherto unknown, and I think that in a short time we shall be able to establish certain standards that will satisfy the sanitarians and that can be lived up to by the oyster growers.

Mr. WILLIAMS. When I accepted the invitation of my local board of health to attend this meeting I knew that I would be greatly rewarded by listening to the papers that were to be read here, and I was especially interested, of course, in the paper that Professor Phelps was to read. I have had a number of very interesting meetings with Professor Phelps and Professor Sedgwick with regard to the disinfection of sewage.

New Bedford, as you may know, has been doing its best to become a large city and in doing so it has had to meet a few of the ills that come with municipal growth and development, one of which is the very serious pollution of the river upon which it is located. This body of water which we call the Acushnet river, is really only a tidal arm of Buzzard's Bay. But we have succeeded in polluting it to such an extent that a few years ago the State Board of Health prohibited the further taking of shell fish from its waters. These shell fish, of course, did not include oysters. They did include the famous little neck clams, which, I understand, we have distributed to quite a considerable extent over various parts of the country.

In order to relieve ourselves from a very serious situation and to save a business which furnishes employment to a great many of our citizens the city undertook, two years ago, to provide for a further disposal of its sewage. We have now started upon the construction of an intercepting sewer which will collect all the sewage of the city and deposit it at a point in Buzzard's Bay something over half a mile from the most extreme point of land in New Bedford. Furthermore the sewage will be delivered in water about 30 feet deep at low tide where it will also come in contact with the great tidal movement of the water of Buzzard's Bay.

When we announced our intention some of our neighboring shore towns became seriously alarmed as to what the effect might be upon their shores, and so, to relieve them of any cause for alarm, we consulted with Professor Sedgwick and Professor Phelps and thereby learned of their great interest in the disinfection of sewage. Disinfection of sewage, of course, has been generally known about in one way or another for a good mnay years, but up to this time none of us knew of any practicable way of disinfecting raw sewage.

You probably understand that our situation was such that we could not very well introduce sand filters, because we didn't have the sand areas suitable for the purpose, and contact filters were also a very expensive method of treatment for a city situated as we are. And so we have decided that the proposition of Professors Sedgwick and Phelps was worthy of our consideration. We have gone into the subject to a considerable extent; and we have decided that we will provide at a point near the outlet of our intercepting sewer for disinfecting the crude sewage by the addition of chloride of lime, or ordinary bleaching powder if later it is definitely decided to adopt this method of treatment. While our plant is not yet built we are preparing plans with that object in view.

Gentlemen, that, in a few words, places New Bedford's position before you. I thank you very much.

Prof. PHELPS. There have been, Mr. Chairman, two things said here about the oyster that I want to say do not apply to the clam. First, Professor Gorham says the oyster loves clean waters and will not grow near sewers. That certainly does not apply to the soft shell clam. Then Professor Whipple tells us the oyster shuts up and fasts in winter. That, according to my observation, the soft shell clam does not do. And so, however we may remove suspicion from the oyster, I think this clam situation is going to still be with us. It is certainly true that the clam is inherently a filthy beast. He seems to prefer polluted waters and grows fatter and faster in them. The oyster may be wise and we may possibly trust to his discretion, but the clam, proverbially happy, needs the guardianship of the State to keep him from falling into evil ways.

Mr. STEPHEN DEM. GAGE. I have been much interested in Professor Gorham's paper and am particularly pleased that he has drawn the distinction so sharply between polluted or dangerous oysters and oysters that are merely dirty. The shellfish situation in Massachusetts is quite different from that in Rhode Island and in the States further south. In these States the oyster is the only mollusk of any economic importance. The hard and soft clams apparently are unable to grow south of New Jersey and the few beds of these clams which existed at one time along the shores of Long Island Sound and in Narragansett Bay have been practically depleted. Even the clams for the famous Rhode Island clambakes are now brought in from Massachusetts sources. On the other hand, north of Massachusetts, the oyster industry is so small as to be negligible, but the gathering of hard and soft clams and of scallops is an important industry. Massachusetts lies intermediate between these zones and along different portions of her coast all of these various types of shellfish are gathered in greater or less quantities. In 1909, the Massachusetts Fish and Game Commission published a special report on the Mollusk Fisheries in the State and some statistics from that report showing the relative amount and value of these different shellfish gathered annually may be of interest. The number of men employed in the oyster industry was 159, in the scallop industry 645, in quahaug or hard clam industry 745, and in soft clam industry was 1,360. The catch of oysters is about 115,000 bushels per year valued at $148,000, of scallops 86,000 bushels valued at $164,000 ,of hard clams 144,000 bushels valued at $195,000, and of soft clams about 154,000 bushels valued at about $150,000. It will be observed that the value of both the hard and soft clam industries is greater than that of the oyster industry and that the number of bushels of hard and soft clams produced is each much greater than the number of bushels of oysters produced. Furthermore, there is a still greater difference in the food value of these various shellfish owing to differences in thickness of shell and differences in actual food value of their bodies. Computed on this basis the oyster industry produces only about 8 per cent., while the hard clam industry produces about 17 per cent. and the soft clam industry produces over 37 per cent. of the food value of the entire shellfish industry.

For more than ten years the State Board of Health has been studying the question of the pollution of these various kinds of shellfish, and in certain instances, areas which are dangerously polluted have been closed. The question of the pollution of clam flats is the most serious problem, however, as not only is the soft clam industry more important from an economic viewpoint, but the flats from which soft clams are found are widely distributed along the shores of the State and as has already been stated, the soft clam will grow and thrive in shallow water in close proximity to public sewers, while the other mollusks mentioned are natural inhabitants of deeper waters where pollution is reduced to a greater or less extent by dilution.

CHAIRMAN'S ADDRESS, SECTION OF MUNICIPAL HEALTH OFFICERS AMERICAN PUBLIC HEALTH ASSOCIATION

Dr. A. J. Douglas,
Medical Health Officer, Winnipeg.

I desire to express to the members of this section my deep gratitude for the great honor they have done me in electing me its Chairman; I can recall no position which has ever been bestowed upon me in which I take as much pride.

I approach its duties with all humility and thoroughly recognize that there are many men here, who by attainments, experience and achievements could fill this position far more worthily than I can hope to.

The Section of Municipal Health Officers, while one of the youngest in our association, is, in a measure the most important, for it concerns itself with the men who are possibly most actively engaged in the cause of public health —the men who are, as it were, on the firing line. The laboratory workers, the vital statisticians, the sanitary engineers and the sociologists, point us the way; they indicate the lines along which our efforts should be directed and show us what we may do to control and prevent the scourges which afflict mankind.

But the task of organizing the campaign and fighting the battles is upon our shoulders and entrusted into our hands. To us is given the difficult and ofttimes thankless task of coaxing or driving people to do things for their own good and that of others which they do not wish to do.

If what we accomplish while meeting together causes us to become more efficient; if it helps bring about results to make the place from whence we come a better, healthier place to live in; if it makes us sanitarians in the broad sense of the word, we shall warrant our existence as a section.

The American Public Health Association is now an old organization which has attached to its name a history of high ideals and worthy deeds accomplished.

The Laboratory Section has done and is doing a splendid work; the Section of Vital Statistics, still young, is ably fulfilling its mission; I trust that ere long our section may be able to point to land marks that it has made in the history of preventive medicine.

In the public health renaissance that has taken place during the past ten years the position of the municipal health officer has increased enormously in importance and his relation to society has undergone a great change.

Even as short a time as eleven years ago, when I first took office, the health officer, in my community at least, was looked upon by most people as a rather unnecessary appendage to the municipal pay roll—not only unnecessary but very often pernicious, for sometimes he had the temerity to interfere with citizens, particularly the so-called best citizens' inalienable rights to do as they pleased.

It was considered that his proper sphere was to supervise the collection of city wastes, to keep the streets clean, to juggle with statistics (always with a

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Read before the Municipal Health Officers' Section, American Public Health Association, Havana, Cuba, December, 1911.

view to emphasizing the salubrity of his own locality), and to occasionally show some activity during outbreaks of the more serious communicable diseases. But should the particular outbreak he was engaged upon not promptly subside under his efforts he might be used as a convenient scapegoat for its presence and be removed to make room for someone else.

He was always to use discretion as to whose toes he trod upon; he was not to point out glaring sanitary defects in his community as this spoiled business and kept visitors away. His office was commonly situated in a sequestered corner of the municipal building, preferably the basement; his staff was undermanned, often made up of incompetents appointed for almost any reason but that they were practical sanitarians. His salary was usually small and the appropriation for the upkeep of his department was kept down almost to the vanishing point.

One of the most hopeful signs of the times is the manner in which this state of affairs has changed and is changing. The change is almost wholly due to increased interest on the part of the public in the problems of hygiene. The public is slowly grasping the fact that there is another medicine than the old one which aimed only to cure disease, it is beginning to discover the new medicine whose object it is to keep people well by instructing them how to avoid disease, and by remedying all conditions which are dangerous to health. In this sanitary propaganda the municipal health officer has borne a part, and he is every day becoming a greater factor in it. This is right and proper, and it should be the resolve of this section and every member of it to further the movement as much as possible.

The health officer is becoming more and more a publicity agent and an educator; the old policy of silence in health matters is being discarded and they are now being treated with the utmost frankness. Information is given out by the health officer himself over his signature, or from the lecture platform, stating what conditions exist and what should be done to remedy them; the public is beginning to drop the old apathetic and critical attitude and is showing a disposition to do things when told what to do. No just cause ever suffers from a clear and true statement of facts, and this has been borne out time and again in sanitary work. Governing bodies are beginning to appreciate this, and where the suggestions of the health officer formerly met with indifference or opposition, he is now assured of a respectful hearing and usually of co-operation and financial support.

The press and the magazines are manifesting an enthusiasm in the work and are glad to publish authoritative statements—they will print columns of advice. The innovation of a daily health article recently introduced by a great newspaper, the Chicago Tribune, under the guidance of a distinguished member of our section, is very significant and commendable; it should prove of inestimable benefit not only to the citizens of Chicago but of the whole United States and even further afield.

It is thus abundantly evident that in modern hygiene more stress is being constantly laid upon publicity and popular education; we should therefore encourage all things that accomplish these ends. The good work for the cause that can be done by the issue of a departmental bulletin and by educational leaflets is, in my opinion, great.

Exhibits, accompanied by illustrated lectures covering the varied sphere of our activities, are, I consider, of the utmost importance. I should like to see health exhibits established as permanent institutions, at least in the larger centres. When people can see for themselves conditions in their own community set forth in a graphic and unmistakable manner, with the right way and the wrong way side by side, it cannot but have the effect of waking them up to the need of putting their own houses in order and making them better and more useful citizens. The fact that the public is beginning to appreciate our efforts and objects constitutes our opportunity, and it behooves us to keep abreast of the times and put forth our energies to keep this interest alive.

While many communities are doing things for sanitary betterment, there are many that are not. What can we do to help the backward ones? I would offer one or two suggestions:—

The tenure of office of the health officer is far too insecure in many cities and towns, and his reward too small to encourage competent men to give their best services and put their hearts into the work.

If it were within the power of this section and association to do something that would make it possible that only men either with previous experience or with a preliminary education in which special attention has been paid to public health, be appointed to the positions of health officers, and when appointed that they could only be removed for cause, I feel certain that a great advance in general efficiency would be made.

There are still being appointed to these most important positions men who have had no previous experience or training which would fit them for the duties they are about to undertake, and when these men have by their own exertions acquired a wealth of valuable experience and become useful and competent officials, they are removed through a change in administration and the same process is gone through again. I am aware that this is a most difficult problem for any association to deal with as the evil is widespread and flourishes under so many different conditions.

Another point which should be emphasized is the entirely inadequate remuneration allowed municipal health officers in many places, often making it impossible for them to devote their whole time to the work. It should be impressed upon governing bodies that the man to whom is given the onerous duty of guarding the health and lives of citizens should be paid in keeping with his high calling.

If security of office and good salaries were assured municipal health officers, and the services of competent men generally insisted upon, I feel certain death rates would be lowered all over the continent and more men would adopt public health as a profession.

A number of universities in the various countries represented here are now giving courses for the diploma of public health which ensures a constant supply of trained hygienists.

What has been said of the health officer himself is almost equally applicable to his assistants (and without good assistants a departmental head is badly off), I feel sure that every one of us here has experienced difficulty in obtaining and keeping efficient medical, sanitary, and meat and food inspectors. Too often these are appointed not for their technical knowledge and ability to apply it, but from the fact that they possess that mysterious but potent attribute, a pull.

In America, so far as I am aware, there is no organization similar to the Royal Sanitary Institute of England which trains inspectors for the various posts in health departments and confers diplomas upon completion of its course and the passing of its examinations. This institute has done much to further public health in Great Britain and her colonies, and I can speak from personal experience as to the efficiency of the training its graduates receive. The examinations of the institute are held at stated times in various centres throughout the British Empire; an applicant does not need to leave his own colony to take the examination in most cases.

A plea for an American or international institute along similar lines was put forth in the columns of our Journal not long ago, and I would recommend the idea to your consideration.

If such an institute is ever started on this continent I should like to see it under the Aegis or with the approval of this association and this section.

If an institute of this character were in operation and its qualifications generally recognized a time would come when it would be difficult or impossible for an incompetent to obtain a position in an up-to-date department; the standards of departmental efficiency would everywhere be raised; we would be employing from the start, men who know and would not have to be taken by the hand and taught their duties, at the public expense, and through their own mistakes, a process which usually takes years and which sometimes is never accomplished.

Is it not within the province of this section to inaugurate or lend its support to some movement which will eventually react for the public good by making for the appointment of trained men to the various positions in sanitary work and assure an adequate recompense and proper tenure of office after such appointments have been made?

A MOSQUITO LARVACIDE--DISINFECTANT AND THE METHODS OF ITS STANDARDIZATION

S. T. Darling,

Board of Health Laboratory, Ancon Hospital, C. Z.

To the sanitarian in the tropics no subject is of greater importance than the destruction of mosquito larvæ. One of the means used toward this end by the Sanitary Department in the Canal Zone is a [1]larvacide prepared from crude carbolic acid, the details of manufacture of which were worked out by Mr. J. E. Jacob, Chemist, Board of Health Laboratory.

The special features of the product are its cheapness, high larvacidal and germicidal powers, miscibility with water, relative uniform composition and the methods used to determine its larvacidal and algacidal value.

In the work of destroying algæ and mosquito larvæ in the Canal Zone, large quantities of the larvacide are used, the amount averaging 250 barrels a month, and a plant erected for its manufacture has been in operation over two years.

The larvacide is prepared from crude carbolic acid, a substance which as usually supplied contains from 5 per cent. to 30 per cent. tar acids, together with a large amount of inert neutral oils. The crude acid is immiscible with water and is a very inefficient disinfectant on account of its inability to come into intimate contact with microörganisms. When, however, the crude carbolic acid is made into a liquid soap with resin and alkali by means of heat, a product results which emulsifies upon the addition of a large amount of water. If the germicidal value of the emulsion is determined by the method of Rideal and Walker it will be found to be greatly enhanced, frequently being from two to five times greater than that of pure carbolic acid.

The product is not only a most effective destructive agent for mosquito larvæ, but is a valuable cheap disinfectant.

Method of manufacture: To insure the manufacture of a uniform product requisitions call for crude carbolic acid of a specific gravity not greater than 0.97 and to contain not less than 30 per cent. tar acids. Each consignment of crude carbolic acid received is assayed at the Laboratory to determine its specific gravity and percentage of tar acids, for it is necessary to keep the product of a specific gravity approximately that of water so that it will diffuse rapidly and not sink to the bottom nor remain on the surface.

One hundred fifty gallons of crude carbolic acid are heated in an iron tank having a steam coil with steam at 50 pounds pressure. Two hundred pounds of finely crushed and sifted common rosin are dissolved in the heated acid and then 30 pounds of caustic soda dissolved in 6 gallons of water are added. There is a mechanical stirring rod attached to the tank. The product is ready in a few minutes, yielding about 3½ barrels.

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[1] Darling, S. T., Studies in Relation to Malaria, Isthmian Canal Commission, Department of Sanitation, Laboratory of the Board of Health, Washington, Government Printing Office, 1910.

[1] Darling, S. T., Factors Concerned in the Transmission of Malarial Fever in the Isthmian Canal Zone, Annals of Tropical Medicine and Parasitology, University of Liverpool, 1910, iv., 179.

[1] Report of the Department of Sanitation of the Isthmian Canal Commission for the month of August, 1909, W. C. Gorgas, Colonel Medical Corps, U. S. Army, Chief Sanitary Officer, Washington, Government Printing Office.

Cost of manufacture, August, 1909:

Amount manufactured, 14,600 gallons (292 barrels).

12,600 gallons crude carbolic acid at .12 per gallon....	$1,512.00
12,300 pounds rosin at $2.48 per hundred..........	305.04
2,550 pounds caustic soda at $3.70 per hundred.......	94.33
Two tons coal, $5.00 per ton.....................	10.00
Labor	92.46
Supervision	50.00
Total	$2,063.83

Cost per gallon, $0.1413.

The germicidal value when tested with B. typhosus in an aqueous emulsion of the larvacide has an R-D coefficient of from 2 to 5.

As a mosquito larvacide it is used by spraying an aqueous emulsion (one part of larvacide to five of water) over the surface and along the margins of pools and ponds or other mosquito breeding places so that the resulting dilution of the larvacide has a thin milky opalescence representing approximately a dilution of 1 to 5,000.

From time to time tests are made of its larvacidal powers. This is done by preparing dilutions of 1 to 5,000, placing the resulting emulsion in moist jars or other large glass vessels and introducing Anopheline, Culex or Stegomyia larvæ into the jar and noting the time required to kill the larvæ, or the time when they leave the surface and are unable to rise.

After the introduction of larvæ into the emulsion by means of a pipette they are seen to show signs of excitation, with loss of the sense of direction. This is followed by convulsive movements, after which they sink to the bottom, but may rise several times before being killed. As anopheline larvæ commonly remain on the surface for long periods, it is necessary during the test to touch them gently with a wire or pin to ascertain if they have been killed. If they are dead they will, upon being gently pushed beneath the surface, sink to the bottom and remain there. This gentle manipulation does not hurt them in any way, for larvæ in control jars have been handled in this way for days without interfering with their subsequent development.

The larvacidal powers vary slightly with different grades of crude carbolic acid, but an average result is as follows:

Dilution 1 to 1,000—Culex larvæ, dead in 5 minutes; Anopheline larvæ, ½ grown, dead in 5 minutes; Anopheline larvæ, full grown, dead in 10 minutes.

Dilution 1 to 5,000—Anopheline larvæ, ½ and full grown, dead in 5 minutes; Culex larvæ, ½ grown, dead in 3 minutes.

Dilution 1 to 10,000—Culex larvæ, ½ grown, dead in 64 minutes; Anopheline larvæ, young, dead in 52 minutes; Anopheline larvæ, full grown, dead in 135 minutes.

Dilution 1 to 15,000—Culex larvæ, small, dead in 32 minutes; Anopheline larvæ, dead in 123 minutes.

Anopheline larvæ are slightly more resistant than Culex larvæ, and all pupæ are more resistant than larvæ to the effects of the larvacide.

With a larvacidal agent so destructive to mosquito larvæ and bacteria it is natural to inquire what loss of efficiency occurs when the larvacide is placed in pools in contact with algæ and protozoa, and how often it will be necessary to re-apply the larvacide for the purpose of destroying mosquito larvæ. If its powers are lost in destroying all the mosquito larvæ in a given pool, then assuming that mosquito eggs are laid on the pool immediately afterward, it will be necessary to reapply before that brood pupates, for pupæ are more resistant to the powers of the larvacide and the latter cannot be depended upon to destroy them. I have found by breeding anophelines in the Laboratory that for *A. albimanus* the egg period is about 36 hours; the larval period about 9 days, and the pupal about 2 days. As these periods are very likely a little shorter out of doors where there is abundant sunshine and food, the sanitary inspectors reapply the larvacide every 7 days. In this way they aim to destroy all broods in the larval stage and thus prevent breeding.

While the larvacide in dilutions of 1 to 5,000 is toxic to mosquito larvæ and destructive to algæ and protozoa, and its efficiency lowered, it is not absolutely destroyed, for it will be seen upon inspection of pools and artificial test tanks that the water retains some of its opalescence for several days.

Very little appears to have been done on the subject of the heightened power of emulsified germicides over those in solution. According to Chick and Martin†, Henle found that "creolin," which is an emulsion of tar acids (analogous to the larvacide described here), was a more efficient disinfectant than could be explained upon each of its constituents separately, and concluded that the extra efficiency is connected with the emulsified form; and that Rideal and Walker stated that an emulsion of "Tricresol" was equal in germicidal power to a solution three times as concentrated. Chick and Martin, from their experiments with B. paatyphosus and staphylococcus pyogenes aureus, are of the opinion that "there is little doubt that the removal of an emulsion of tar acids by bacteria is in the first instance a process of adsorption and not a chemical combination, and that disinfectants of this class possess superior efficiency because owing to this adsorption the bacteria rapidly became surrounded by the disinfectant in much greater concentration than exists throughout the liquid."

This, I believe, holds true for algæ and protozoa. When emulsions of larvacide are put up with large quantities of algæ, such as *spirogyra*, the larvacide loses its turbidity, 50 per cent. being lost in some concentrations within two hours. Microscopic examinations fail to disclose a cause for this loss of turbidity.

When freshly prepared and exposed to algæ it is seen that the emulsion contains globules of various sizes ranging from the larger, which are about three m. in diameter, to those just visible with the highest powers, and the disturbance of the fluid due to Brownian motion indicates that there are myriads of ultra-microscopic particles and that the "bombardment" of the surface of the algæ is more marked on the part of the smallest particles. When the interior of the algæ was scrutinized for globules of larvacide, although few were seen, it did not appear that they could account for the loss of turbidity. A good deal of the loss of turbidity appears to be due to the formation of larger globules, thus imparting a darker color to the emulsion, and thus removing part of the opalescence, as in the formation or separation of cream from milk, and this separation must remove a large portion of the larvacide from contact with bacteria and algæ.

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† Chick, H. and Martin, C. J., Jour of Hygiene, VIII. 698, 1908. "A Comparison of the Power of a Germicide Emulsified or Dissolved with an Interpretation of the Superiority of the Emulsified Form."

Oil globules were not generally adherent to the outside walls of the algæ and they were not always agglomerated, though this was observed in some preparations.

After a week's exposure of algæ to larvacide, some globules from 1 to 3 m. in diameter were found in the interior of the algæ; and this suggests that the "bombardment" of microscopic and ultra-microscopic particles of larvacide finally results in its penetration of the algæ, and that when a large amount reaches the interior, fusion of the particles results.

The gradual loss of efficiency of the diluted larvacide when in continued contact with algæ was determined by exposing larvæ to freshly prepared mixtures of larvacide plus algæ and protozoa, and to mixtures of the same that had been in contact from 1 to 7 days. As an additional control the effect was noted of placing larvæ in fresh water with algæ which was not aerated, for in this instance a pellicle forms on the surface of the water and the algæ and larvæ die.

From an inspection of the following table it will be seen that the larvacide when freshly prepared destroys mosquito larvæ within a few minutes—see second horizontal column.

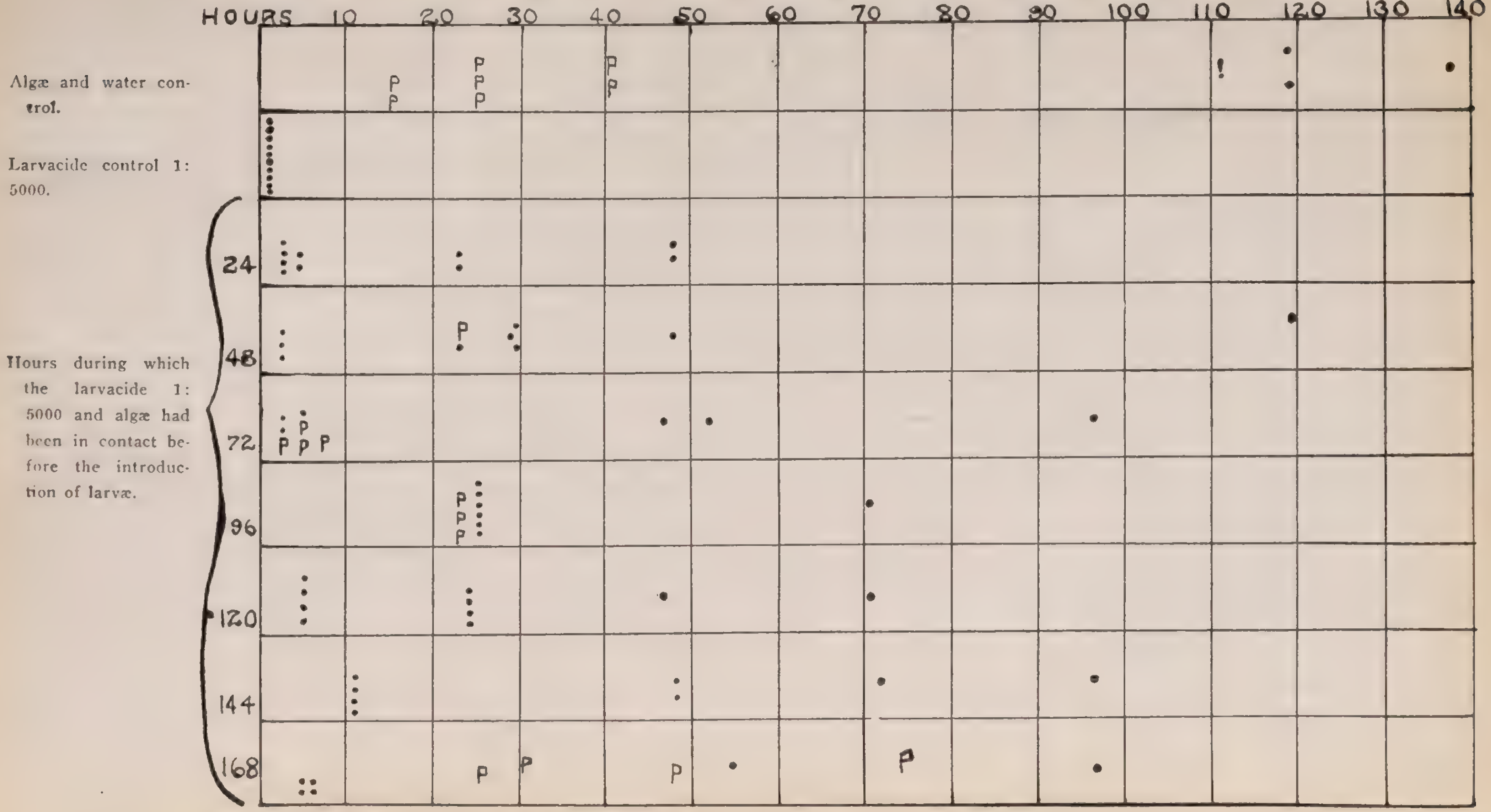
The table shows that the efficiency of the larvacide lasts for at least 7 days and certainly longer. It also shows that when in contact with algæ for a period of 1 to 7 days, 70 per cent. of the larvæ are destroyed within 48 hours.

It is seen that the larvacide hastens pupation; and the algæ control shows that when larvæ are placed in contact with fresh algæ and fresh water the larvæ pupate naturally for several days; decomposition, however, sets in after 110 hours with the formation of a pellicle of bacteria and protozoa on the surface. The anaerobic conditions beneath the pellicle cause the death of algæ and larvæ. This may be prevented when it is desired by aerating the tank with an air jet.

Published with the approval of Colonel W. C. Gorgas, U. S. A., Chief Sanitary Officer, Isthmian Canal Commission.

Received for publication Feb. 2, 1912.

TABLE SHOWING THE HOUR AFTER EXPOSURE AT WHICH ANOPHELINE LARVÆ EITHER DIED (.) OR PUPATED (P).



P=pupation of larva; this means that the larva was not killed but pupated and emerged later.
.=the hour after exposure to the test when the larva died.
!=after 113 hours a pellicle formed on the surface and an odor of decomposition was present, causing the death of larvæ.

American Journal of Public Health
Official Organ of the American Public Health Association.
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. FEBRUARY, 1912. Number 2.

$2.00 a year. 20 cents a copy.
LIVINGSTON FARRAND, M. D., Editor SELSKAR M. GUNN, B. S., Managing Editor
PHILIP P. JACOBS, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

A NOTABLE STUDY OF THE COLD STORAGE QUESTION

In connection with the pure food agitation which during the last few years has run like an epidemic all over the land cold storage has not escaped attack. It has been freely alleged that by the cold storage of foods the public health has been endangered and the cost of living increased. A carefully prepared report by a Massachusetts commission created by the legislature and appointed by the Governor to investigate these questions has just been made public and throws a flood of light upon the whole subject. Some years ago the State Board of Health of Massachusetts by order of the legislature made a report on the cold storage of drawn and undrawn poultry, based upon investigations made at its request by Dr. Boos. The present report comes from a special so-called "Cold Storage Commission" and covers a much wider field. The membership of the commission includes persons practically familiar with the subject, and its secretary was Professor F. Spencer Baldwin of Boston University, a political economist of high standing who had already the year before served on a State Commission on the Cost of Living. The commission held public hearings and heard much testimony so that the report is lengthy and covers almost the whole field.

The report states that "with respect to the influence of cold storage on health, the commission finds that in the main it is beneficial. While abuses have arisen, through the holding of food products in cold storage for unduly long periods and through the handling of goods by improper methods before and after, as well as during, refrigeration, the benefits that have come from the salvage of food through cold storage far outweigh any evils that have developed in this field. Cold storage has brought about an expansion and diversification of the food supply of the population, making certain kinds of food more abundant and more accessible. It thus makes for the conservation of the vital resources of the people. The gain from this source is universal and permanent; the injuries are occasional and temporary, and can be eliminated by proper regulation."

The following are in detail the conclusions of the commission with regard to the connection between cold storage and public health:

1. A progressive deterioration takes place in perishable food products kept in cold storage; the changes naturally occurring are greatly retarded by refrigeration, but are not absolutely suspended. Therefore, a food product that has been held in cold storage is never just as good as the perfectly fresh article, other conditions being equal.

2. The deterioration taking place during cold storage first appears in a change in flavor, which may effect the palatability of the food, but does not necessarily affect its wholesomeness or nutritive value.

3. The length of time during which an article of food held in cold storage can be kept wholesome and fit for consumption varies for different commodities.

4. The period of proper preservation for any particular commodity depends largely on the method of handling and preparing for cold storage.

5. Scientific investigation in this field has not yet been carried far enough to enable one to fix normal time limits of storage for different commodities.

6. On the whole, prolongation of the storage period beyond one year, even under correct conditions, appears to be undesirable, and prejudicial to the public health.

Nor does cold storage increase the cost of living. On the contrary, by saving up the surplus (which would otherwise be lost) against a period of scarcity, it prevents waste and virtually increases production. And since an increased production means a larger supply, this tends to cause lower, rather than higher, prices.

While realizing that the effects of cold storage on health and prices are generally beneficial to the public, the commission nevertheless points out that there is need of some legislation for the regulation of the business. "Cold storage is an industry of a public character. It plays a rôle in the distribution of the food supply analogous to that of the railway in the transportation of commodities in general. The railroads are 'common carriers;' the refrigerating warehouses are 'common storers.' A business of this kind should be subject to supervision and control by the State. The object of regulation should be to prevent abuses and protect consumers without imposing on the business unreasonable restrictions that would interfere with its legitimate operations and hamper its proper development. The measures of regulation should be of such a nature as to attain the object sought with a minimum of expense and inconvenience to the business interests affected."

In order to accomplish these results it is suggested that extensive powers be delegated to the State Board of Health with respect to the regulation of cold storage establishments. The following are the principal measures of regulation proposed:

1. Cold-storage warehouses should be subject to the supervision of the State Board of Health, and should be required to take out licenses and submit regular reports. The main object of the proposed inspection is to ensure the proper condition of goods upon entry into storage and their proper treatment during the storage period.

2. Food products deposited in cold storage should be marked either on the individual articles or on the containers with the dates of receipt into storage and of withdrawal from storage. The reason for this requirement is to afford

a means of identifying cold-storage commodities as such in the trade, and of conveying to purchasers information to which they are entitled with respect to the commercial history of the food products which they buy, including the length of time goods are held in storage. (Two members of the commission dissent from the recommendation with regard to the marking of the date of withdrawal.)

3. The time for which food products may be held in cold storage should be limited to twelve months, with discretionary power vested in the State Board of Health to extend the time limit for particular consignmen of goods, and also to fix a shorter time limit than twelve months for any article of food if such further restriction of the storage period should be found upon investigation to be desirable.

4. The fraudulent sale of cold-storage products as fresh goods should be prohibited. It is generally admitted that the purchaser has a right to know whether he is getting cold-storage or fresh food. A provision requiring that purchasers shall be informed upon this point is a legitimate and desirable measure for the protection of consumers against deception.

5. The return to cold storage of goods that have once been withdrawn and placed on the market for sale to consumers should be prohibited. Such goods are presumably not in fit condition for further storage. The prohibition of restorage is needed to protect consumers against a practice that unquestionably leads to abuses.

The commission recommends that the regulations apply to fresh meat and meat products, fresh food fish, poultry, eggs, butter and any other commodities that the State Board of Health may see fit to add.

To summarize it may be said that the two most important conclusions of the commission are (1) that cold storage is not to any great extent a public health question and (2) that cold storage does not ordinarily increase but rather diminishes the cost of living. It is however rightly recognized that cold storage foods, likek all foods, come to some extent within the purview of the guardians of the public health.

We are of the belief that the wide distribution of this report should have a great effect in disillusioning the public of many fallacious beliefs concerning the cold storage of food-stuffs, and should lead to a better appreciation of one of the most important discoveries of man.

IMPORTANT ANNOUNCMENT

At the meeting of the American Public Health Association, held in Havana, in December, it was voted that arrangements should be made for uniting so far as possible the offices of secretary and treasurer of the Association with the editorship of the Journal. The secretary of the Association, Dr. Woodward, very kindly consented to continue to act in that capacity until the Committee on Journal should have completed its arrangements.

The reorganization of the Journal having been effected, the Committee of Seven announces the election of Mr. Selskar M. Gunn of Boston, as secretary of the American Public Health Association, and of Dr. Livingston Farrand of New York, as treasurer. Mr. Gunn's address is 739 Boylston Street, Boston, Mass., and Dr. Farrand's address is 289 Fourth Avenue, New York City.

THE RELATION OF THE PUTRESCIBILITY OF THE SETTLING AND NON-SETTLING SUSPENDED MATTER IN SEWAGE.

DR. ARTHUR LEDERER,

Chemist and Bacteriologist, Sewage Testing Station, Sanitary District of Chicago.

When we speak of a raw sewage being "strong" or "weak," we have, ordinarily, factors in mind which are furnished by the chemical determinations of total organic nitrogen, organic carbon, chlorine, and possibly fats. To one who is dealing continuously with one and the same sewage the suspended matter will give a fairly good idea of the strength of the sewage. It is likewise apparent that certain relations can be established between some of the chemical constituents from a long series of analyses. However, in different localities all these factors and relations will be subject to modifications, the chief cause for which lies in the varieties of trade wastes likely to be present in the majority of American sewages. In a general way a stronger domestic sewage will require more dilution in a water course than will a weaker, as expressed by any of these factors above.

Up to the time of the introduction of the methylene blue putrescibility test, we have lacked a definite expression for the strength of a sewage from the standpoint of a prospective nuisance. Since the vast majority of sewages reach the surface water in an unpurified or partially purified state, it is clear that any determination in which the natural agencies participate (as is the case in the putrescibility test of Spitta and Weldert) must of necessity come closer to the actual changes occurring in water courses than a purely chemical test, such as the determination of "oxygen consumed." This is the more apparent when we consider that the different methods in vogue of determining "oxygen consumed" give rise to very perceptible differences in the results. The methylene blue putrescibility test, as is well known, depends upon the formation of a colorless leucobase as the oxygen in the sample becomes exhausted. The test has been made more valuable by Phelps[1], who worked out relative stability figures which serve as a numerical measure of the relation between the available oxygen and the oxygen required for complete oxidization. Since the reaction is a biologic one, an incubation temperature of 20° C. will favor the development of bacteria likely to take part in the self-purification of rivers, while a temperature of 38° C. will favor the development of a bacterial flora not likely to take part in nature. The methylene blue test is at present almost universally used in sewage purification plants, and serves its purpose well. The main objection to the test, however, has been the time which is consumed to obtain results. This is the chief reason why sometimes an incubation temperature of 38° C. is preferred to the more desirable temperature of 20° C.

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(1).—"Putrescibility and Stability of Sewage Effluents." Contributions from the Sanitary Research Laboratory and Sewage Experiment Station, Mass. Institute of Technology, Boston, Mass.—Vol. 5, page 74.

Read before the Laboratory Section, American Public Health Association, Havana, Cuba, December, 1912.

Recently interest was awakened in the test for the loss of dissolved oxygen in a sewage mixture on incubation for a definite period of time under anaerobic conditions. The loss of oxygen, as determined quantitatively, serves as a measure of the stability of the sewage or the sewage mixture. This test is a more direct measure of the probable effect upon the stream than the methylene blue test. The test is not a new one. On looking over German literature repeated mention is found of "Sauerstoffzehrung" among the analytical data, the result of which is obtained by methods substantially the same as described above. Mention was first made of the results obtained with this method in this country in the report of the Lawrence Experiment Station for the year 1900 (Mass. State Board of Health). The test was also referred to recently as a good measure of stability by the writer[2], and by C. B. Hoover, of the Columbus Sewage Works.[3] Hoover likewise recognized that the analytical results usually employed to show the degree of purification effected by sewage treatment do not reveal quantitatively the relative stability, and hence can not be looked upon as reliable indices of the deoxygenating properties of sewages, sewage mixtures or effluents. As a result of a long series of tests he obtained certain definite relations for sewages, septic effluents and filter effluents as determined from a modified "oxygen consumed" test and the loss of dissolved oxygen on incubation, described previously. It may be possible to establish such a relation in dealing with one and the same sewage for a long time, but the relation is bound to differ in various places to a great extent. The method does not lend itself to a ready expression of the stability. Hoover measured his loss of dissolved oxygen by incubaton at 37° C. for 24 hours. There is a possibility, as Phelps[4] has pointed out, in certain effluents, particularly those from rapid filters, of oxygen becoming lost at this temperature without being consumed. The saturation point of oxygen at 37° C. is not over 7 p.p.m., and consequently there is a tendency for some of the dissolved oxygen to escape. Tight stoppers are not likely to prevent the escape of the released gas, nor are mercury seals adapted for routine work.

Recently Phelps[5] introduced his method of calculating quantitatively the stability of a sewage mixture from determinations made by anaerobic incubation at 20° C. for a given period of time. The sewages are mixed with water saturated with oxygen, and the total amount of oxygen is determined directly. The sample is then stored in a tight bottle for a suitable period of time and the oxygen redetermined. The rate at which the oxygen disappears under these conditions is a direct measure of the probable occurrence upon a stream. Under given assumptions, other than those actually occurring in a specific test, the following formula derived by Phelps may be used:—

$$C = \frac{\log \frac{O'}{O}}{Kt}$$

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(2).—"The Influence of Storage and Various Preservatives Upon the Dissolved Oxygen in Waters."—Paper read at the 28th annual meeting of the American Public Health Assn., Milwaukee, Wis., Sept. 5 to 9, 1910.

(3)—"Method for Determining the Parts per Million of Dissolved Oxygen Consumed by Sewage and Sewage Effluents."—*Engineering News*, 65, pp. 311-12.

(4)—"Putrescibility and Stability of Sewage Effluents."—Contributions from the Sanitary Research Laboratory and Sewage Experiment Station, Mass. Institute of Technology, Boston, Mass.—Vol. 5, page 86.

(5)—"Report of Col. Wm. M. Black, U.S.A., and Prof. Earle B. Phelps, Concerning Location of Sewer Outlets and Discharge of Sewage into New York Harbor, 1911."—Board of Estimate and Apportionment.

In this formula C represents the percentage of sewage permissible in the water used for dilution under the assumed conditions, O′ is equivalent to the dissolved oxygen in the mixture before incubation expressed in parts per million, O the dissolved oxygen after incubation. K is a constant which defines mathematically the rapidity with which the oxygen is used up in a mixture of water and sewage. From a specific test K is determined. The formula can then be applied to other cases. According to Phelps, K depends upon the character of the sewage matter and the concentration of that material in the sewage, and is independent of the extent of dilution or the character of the diluting water. Subsequent experiments made by the writer on crude sewages at the Sewage Testing Station of the Sanitary District of Chicago have proven, however, that the factor K is not independent of the amount of dilution. "t" represents in the formula the time which is allowed for the contact of water and sewage to produce the change in the oxygen of the mixture.

It occurred to the writer to utilize Phelps' quantitative expression of the stability of sewages to demonstrate the improvement of the liquid by the removal of the settling suspended matter and complete removal of all the suspended matter. The laboratory technique employed for these experiments was the same as employed by Phelps. Two dilutions were made as a rule on one and the same sewage. A dilution of 1 part of sewage to 8 and 10 parts of water from Lake Michigan has given satisfactory results. The time of incubation was 24 hours, and the temperature of incubation employed 20° C. The sewage was mixed with the lake water in a glass cylinder by a specially devised stirring apparatus to insure the least possible aeration. A portion of the same sewage was also filtered through a single layer of Swedish filter paper which removed all suspended matter and pseudo-colloids. The same dilutions were made as with crude sewage and the initial dissolved oxygen determined just as in the crude sewage mixtures. The same dilutions were also made on another portion of the sewage after the suspended matter had been allowed to settle for 4 hours. Citrate of magnesia bottles, with patent stoppers, obtainable at any drug store, have proven very efficient for these incubation experiments. They do not permit air to enter as do some of the bottles provided with ground stoppers.

All the results obtained were calculated on the basis of preserving 30 per cent. residual oxygen after a 24-hour period of contact or flow. Besides this test other tests were carried on, such as total solids, oxygen consumed, and organic nitrogen, in order to bring out the relation of the volatile organic carbonaceous and nitrogeneous matter in solution and suspension to the calculated permissible dilution. As mentioned previously, the factor K in Phelps' formula has not been found to be independent of the dilution. Special experiments carried on with 3 different dilutions on the same sewage have clearly shown that K will decrease with a lower dilution, and the factor C of course will be found to be correspondingly higher. It was further found that the difference in K between the lower dilutions is greater than the difference between the two higher dilutions. As yet the results have not demonstrated a constant difference between C (the percentage of sewage) resulting from the various dilutions, consequently an exponent has not been introduced in the original formula. The highest "C" value has been used to compare results. Values of one and the same dilution only are given for a comparison of the permissible percentage of crude, settled, and filtered sewages in Table I. On the whole, the differences in the factor K in the different dilutions have not been materially different, and are hardly large enough to interfere with the intelligent interpretation of the results.

TABLE I.

Parts per Million.

Serial Number.	Solids in Crude Sewage.		Suspended Matter.				Oxygen Consumed.			Organic Nitrogen.			Per Cent. Permissible Sewage.		
			Original.		After 4 Hours' Settling.										
	Total.	Vol.	Total.	Vol.	Total.	Vol.	Crude.	Settled.	Filtered.	Crude.	Settled.	Filtered.	Crude.	Settled.	Filtered.
1	493	222	68	50	37	30	13.	5.5	4.6	7.5	5.1	4.3	24.6	27.5	42.
2	629	313	266	124	91	55	29.	17.	11.	9.5	...	3.1	18.3	19.2	51.
3	594	295	118	84	45	43	30.	25.	20.	7.1	...	...	4.2	5.0	11.1
4	630	335	162	119	52	40	37.	33.	23.	13.7	11.3	5.7	2.6	5.5	9.4
5	680	385	194	126	75	55	52.	33.	26.	11.9	7.1	6.3	5.0	7.3	11.8
6	654	344	227	127	67	44	51.	28.	23.	12.3	3.3	1.1	4.7	10.3	21.3
7	592	322	187	120	65	57	52.	37.	29.	10.5	5.5	3.3	3.0	5.4	13.3
8	642	318	206	107	65	50	45.	31.	21.	13.0	...	8.0	10.1	18.3	29.4
9	547	270	76	52	51	44	27.	25.	24.	5.9	4.8	2.7	17.7	19.1	29.8
Avg.	607	311	167	101	61	46	37.	26.	20.1	10.1	...	4.3	10.0	13.1	24.3

The striking feature of this table is the last column, indicating the ratio of dilution or the "per cent. permissible sewage" (*C*) of the filtered sewage as compared to the raw and settled sewage. The remarkable result is still more apparent in the following Table II., which indicates the improvement in percentages.

TABLE II.

Serial Number.	Suspended Matter.				Per Cent. of Volatile Matter left in Solution. After		Per Cent. Reduction of Oxygen Consumed.		Per Cent. Improvement in Permissible Sewage.	
	Per Cent. Removed by Settling.		Additional Per Cent. Removed by Filtration.							
	Total.	Volatile.	Total.	Volatile.	Settling.	Filtration.	Settling.	Filtered.	Settling.	Filtered.
1	46	40	54	60	91	77	58	65	11	71
2	66	56	34	44	78	60	41	62	5	179
3	62	49	38	51	86	71	17	33	19	164
4	68	66	32	34	76	64	11	38	111	262
5	61	56	39	44	81	67	37	50	46	136
6	71	65	29	35	76	63	45	55	119	353
7	65	53	35	47	80	63	29	44	80	343
8	68	53	32	47	82	66	31	53	81	191
9	33	15	67	85	97	81	7	11	8	68
Avg.	63	54	37	46	82	68	30	46	31	143

Looking over the average of the 9 experiments in Table II., we note, for instance, that on removal of 63 per cent. of the total suspended matter, or 54 per cent. of the suspended volatile matter, the actual improvement in the sewage from the standpoint of a prospective nuisance is but 31 per cent. Results similar to this have been obtained by C. B. Hoover. The sewages with the low suspended matter (experiments 1 and 9) have the low percentage improvement.

One exception is found in experiment 2 with a high suspended matter and a low improvement from a dilution standpoint. Now, when we turn to the results obtained by filtration we will note in Table II. that the removal of only 37 per cent. of suspended matter or 46 per cent. volatile suspended matter additional to sedimentation has shown an improvement of 143 per cent. for dilution purposes, or nearly 5 times the improvement gained by merely settling the sewage. Similar is the case with the carbonaceous matter as expressed in "oxygen consumed." A reduction of 30 per cent. of "oxygen consumed" is equivalent to an improvement of 31 per cent. in dilution, while an additional removal of 16 per cent. in "oxygen consumed" gives an actual additional improvement of 112 per cent.

A thorough study of these two tables will clearly bring out the fact that the removal of suspended matter *capable of settling in settling tanks constitutes an improvement* from the dilution standpoint much less than the percentage of suspended matter removed. Since we have to consider the improvement of any sewage or effluent from the standpoint of the degree of dilution required rather than from the standpoint of the reduction of any chemical constituents (as shown by analysis), the improvement made by settling consists mainly in the improvement of the physical character of the liquid by the removal of material which may cause deposits, and incidentally some improvement in the stability. However, the removal of an additional small quantity of suspended matter *not capable of settling*, by simple filtration will improve the liquid *far out of proportion to the percentage of volatile matter removed.* This permits of only one conclusion, that is, on a domestic sewage from a large area the finely divided slowly settling suspended matter and pseudo-colloidal matter not capable of settling make up the greater part of the putrescibility, due to the suspended and colloidal matter. This fact has been recognized before. Spillner[6] states that the organic sulphur compounds in sewages which afford the material for the development of hydrogen sulphide are found in much smaller quantity in the suspended matter, capable of settling, than in the dissolved colloidal and finely suspended matter which has been removed by filtration in these experiments.

In the present state of the science of sewage disposal we aim to destroy the finely suspended matters by oxidization. However, most of the sewage is discharged to-day either in a raw or settled state. If a device can be worked out to take care of the finely divided non-settling suspended matters without resorting to biologic treatment, a degree of purification may possibly be attained intermediate between settling and biological treatment, which in many cases may be sufficient to avoid the expense of the more thorough biological treatment.

In conclusion, the writer wishes to express his thanks to Prof. E. B. Phelps of Boston, and to Mr. Langdon Pearse, Engineer in charge of sewage disposal experiments in Chicago, for valuable suggestions, and further to Messrs. H. B. Hommon and F. Bachmann for their conscientious analytical work.

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(6)—Discussion of Mr. Saville's Paper, "The Emscher Sewerage District and the Imhoff Tank."—*Journal of the Assn. of Engineering Societies*, July, 1911, p. 53.

Discussion.

MR. GEORGE W. FULLER. In my opinion this paper is a valuable one not only for the sake of the specific results which it records, but also on account of the weight which it gives to a decided step in advance with regard to laboratory methods.

The tests themselves show, as did those described by Clarence B. Hoover in the *Engineering News* of March 16, 1911, for sedimentation experiences at Columbus, Ohio, that the putrescibility of sewage is not improved by sedimentation to an extent indicated by the percentage removal of total suspended matters. In other words, the matters in sewage which putrefy readily are found to greater extent, comparatively speaking, in the finely divided particles which do not subside than in the coarser particles which readily deposit.

The use of oxygen for measuring the degree of stability of sewage is a method which has doubtless come to stay. Just how it can best be applied is difficult to state in all of its details. Different sewages would probably give varying results to an extent that will require care not to draw too precise conclusions from early data. The whole movement towards putrescibility tests and stability data as distinguished from the old-fashioned albuminoid ammonia, oxygen-consumed or Kjeldahl nitrogen, is one with which the writer is in full sympathy.

In outlining the historical development the paper of Dr. Lederer would be more complete had reference been made to the reports of the Royal Commission on Sewage Disposal of Great Britain. In their later reports they give considerable information relative to this general method of measuring the organic content of sewage effluents and sewage-polluted waters.

Much credit is due Prof. Phelps for his careful studies in developing stability tests on a practical working basis. The writer some years ago favored somewhat different lines of laboratory procedure, but it is best for all to follow a uniform method. Such a procedure should be the one in most general use, and that unquestionably is now the one developed by Prof. Phelps.

While endorsing the use of this method as a step which should now be adopted in all laboratories, the writer wishes to repeat his earlier comments in regard to the use of incubation temperatures of about 37° C. There is no doubt about the shortcomings of this temperature to some limited extent, as pointed out by Dr. Lederer. On the other hand, it is the contention of the writer that all these results are relative and not absolute, and that the working laboratory at a purification plant needs data as quickly as it is feasible to obtain them. Otherwise the value of the laboratory as an aid to practical operations is materially lessened.

It is noted that Dr. Lederer secures his results by incubation for 24 hours at 20° C. If our recollection is correct, Prof. Phelps used still shorter periods. So far as practicable it is believed that future developments should recognize the importance of the short period, whatever the merits and demerits may be of a temperature of 37° C.

PRESERVATION OF WATER SAMPLES BY SALTING

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ABSTRACT

P. Remlinger, Comp. rend. de la Soc. de Biologie, vol. 70, page 64, 1911, suggests a method of inhibiting the growth of bacteria in samples of water during transportation to the Laboratory by the addition of common salt. In his experiments, ten grammes of sodium chloride were added to one hundred cubic centimeters of water. The flasks so prepared were kept at laboratory temperature and estimations made from day to day. His conclusion was that the salting of a sample of water by the addition of ten per cent. by weight of sodium chloride would prevent any fallacy arising in the bacterial count, provided that the examination was made within forty-eight hours of the collection of the sample.

The importance of this discovery, if true, is at once apparent. Those of us who are constantly engaged in the examination of water transported over considerable distances, know the difficulties of keeping samples properly iced. If we could send out bottles for collection of samples containing a given amount of sterile common salt, and have the sample returned to us without icing, an enormous amount of trouble would be saved, and our results would be much more accurate. It was therefore determined to test the method. Remlinger's plan was followed closely. It seemed good to try other preservatives at the same time. Consequently, duplicate flasks containing resorcin and others containing caffeine were made in a number of cases. Resorcin was used in the strength of two cubic centimeters of a 25 per cent. solution to one hundred cubic centimeters of water. The caffeine was added in the proportion of ten cubic centimeters of an 8.3 per cent. solution of caffeine citrate to one hundred cubic centimeters of water. All were kept at laboratory temperature, plates made from time to time and tests for colon made. We employed samples collected in the ordinary run of business, and samples to which colon was artificially added.

One serious objection to salting, as well as to the other preservatives, was shown at the very beginning, namely: that the growth of colon bacillus is almost invariably inhibited. In only one test out of twenty-eight did we obtain it, although the sample was known to contain colon when the preservative was added. We also find that the bacterial content of the different samples is not acted upon with any degree of uniformity, but varies with the species contained in any given sample. For instance, in one sample of water the count may remain

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Read before the Laboratory Section, American Public Health Association, Havana, Cuba, December, 1912.

practically the same. In the next sample, growth may be almost entirely inhibited. In other words, according to the types of bacteria contained, the action of these preservatives varies tremendously.

Conclusion.—Our conclusion is that neither the salting method proposed by Remlinger, nor the preservation by means of caffeine, or resorcin, has any practical value whatever. We are forced then, for the present, to rely upon refrigeration for preventing changes in samples of water.

SOME LEGAL AND PRACTICAL ASPECTS OF A "BOTTLED MILK" REGULATION

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The Massachusetts Supreme Court has within a few months made an important decision which resulted adversely to the regulation of the Boston Board of Health, requiring the sale of milk in shops in "tightly closed or capped bottles or receptacles" which had been approved by the board. Thus this regulation, which since its inception has been a bone of contention, was nullified after a satisfactory trial of less than one year.

The regulation prohibited the sale at retail of milk or cream in the room or store where the same was put into bottles or other receptacles. In actual practice this involved the purchase of milk by shopkeepers in single package receptacles from milkmen. The authority under which this regulation was adopted was Chapter 75, Section 65 of the Revised Laws, as follows:

"The Board of Health shall examine into all nuisances, sources of filth and causes of sickness within its town, or on board of vessels within the harbor of such town, which may in its opinion be injurious to the public health; shall destroy, remove or prevent the same, as the case may require, and shall make regulations for the public health and safety relative thereto and relative to articles which are capable of containing or conveying infection or contagion, or of creating sickness, which are brought into or conveyed from its town, or into or from any vessel."

This decision, although unsatisfactory from the standpoint of the issue directly involved, is certain to have an important bearing upon regulations of local boards of health in Massachusetts relating to milk as well as to other subjects.

In support of this contention is the opinion of the Supreme Court "that the statute under which the board assumed to act is not broad enough to give them this authority." The Court further states that there is "no power to make general regulations as to conduct or practices injurious to health, which if indulged in by many persons affect the health of the public." Again the Court says, "This statute does not give the board power to make regulations as to all matters affecting the public health." In dealing with this question the Court apparently did not consider the broad general subject of the sale of "loose milk" in shops, but confined itself to the single instance at issue. In the light of the "agreed statement of facts" the Court was of the opinion that "milk kept as this was kept by the defendant was not a 'nuisance, source of filth, or cause of sickness' which gave the board of health jurisdiction to take any action or make any regulation under the R. L. C. 75, s. 65."

This decision has been followed by some criticism of the board for adopting this regulation, i. e., for exceeding its power, and these comments have savored of the theoretic, rather than the practical type. Those who take the board to task should understand that the only feasible plan of determining the legality of a regulation of this kind is to adopt and enforce it. If some aggrieved party

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Read before the Municipal Health Officers' Section, American Public Health Association, Havana, Cuba, December, 1911.

then desires to contest the question, it may be considered by the courts. In adopting this regulation, however, the legal aspect was not neglected and the board had reason to believe from the opinions secured that it would receive legal sanction. Because of this, and the further belief that the sale of "loose milk" was detrimental to public welfare, the regulation was adopted. It went into effect on June 15, 1910, and had the endorsement of practically the entire community. Its enforcement had been carried on with such success that at the time of the above decision only 0.62 per cent. of the daily supply was being sold in shops contrary to the provisions of the regulation. Furthermore, although the influence upon the public welfare from this change of handling cannot be directly demonstrated, the facts obtainable indicate a decided improvement in the quality of shop milk from both chemical and bacteriological standpoints. Thus there were 27.8 per cent. less court prosecutions based on low standard shop milk (i. e., deficiency in milk solids or fat) from June 15, 1910, to February 1, 1911, than for the corresonding period in 1909-'10. Bacteriologically the gain is more remarkable, for despite the fact that the regulation did not become operative until June 15, 1910, 77.80 per cent. of the shop milk for the year 1910-'11 complied with the board's regulation of 500,000 bacteria per cubic centimeter, while for the year 1909-'10 only 54.74 per cent. of the milk from stores conformed to this standard. With these facts, the wisdom of the board's action in adopting this method for the sale of milk in shops cannot be successfully controverted. The above gain, although anticipated and predicted by its sponsors, fully warrants the outlay of energy in behalf of this regulation and consumers who were benefited by its adoption. Any set-back to the movement for improved milk supplies resulting from this decision can be only temporary, even though it could have been wished that the Supreme Court had been less vague in stating that "we do not consider the question whether this regulation goes beyond the constitutional power of the Legislature to enact as a Statute, or to authorize the board of health to establish locally."

Time has demonstrated the bearing which this decision is to have upon other regulations of local boards of health in Massachusetts. Not only in relation to milk, but to the rules relating to other food stuffs has the decision been applied by the judges of other courts.

For illustration: the past summer has been the first in seven years that no prosecutions have been instituted for violation of the rule of the Boston Board of Health which required all milk intended for sale to have a temperature of not less than fifty degrees Fahrenheit. In the matter of the recently established rule of the Boston Board of Health requiring the covering of food stuffs, it has been found impossible to proceed legally against violators of this order, the opinion prevailing with the judges of the local courts in connection with these subjects, that the legality of these regulations was problematical in view of the important decision above mentioned. This attitude has been upheld within a few weeks by a judge of the Superior Court of Massachusetts, who ruled in a case brought by the Board of Health of Lynn against a dealer for violating its regulation regarding the covering of foods, that the order in question to milk, but to the rules relating to other food stuffs has the decision been finding of the Supreme Court under the regulation prohibiting the sale of "loose milk" in shops in Boston.

While discussion cannot determine the legality of other regulations of boards of health relating to milk or to other subjects, their attempted enforcement may be followed by adjudications which, whether in support of or against the government's contention, cannot fail in the end to right existing evils. It would appear that practical relief from these complications can only result either by the adoption by the Massachusetts Legislature of laws based upon the regulations of local boards of health, or by the Legislature granting authority to such health boards to make regulations concerning the handling of all foods, independent of the health issue.

A STUDY OF THIRTY-FIVE STRAINS OF STREPTOCOCCI ISOLATED FROM SAMPLES OF MILK

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It is a matter of common knowledge that streptococci are frequently found in samples of market milk and spontaneously soured milk, but there is no agreement in regard to their sanitary significance. Some laboratory workers, notably Slack and Lewis,[1] are of the opinion that the finding of long chains of streptococci in milk is indicative of an inflammatory condition in the udder of one of the cows furnishing the sample. Lewis attaches particular importance to the finding of long chains of streptococci in association with small masses of pus. The writer has had no experience with the latter method but feels certain that the former is unreliable.

Heinemann,[2] who has made an extensive study of this question, came to the conclusion that streptococcus lacticus, which is nearly always found in spontaneously soured milk, can not be differentiated from pathogenic streptococci derived from sources of human infection. He believes, therefore, that no definite conclusions can be drawn from the finding of streptococci in milk.

Jordan[3] makes the statement that "pathogenic streptococci are sometimes present in milk drawn from inflamed udders, but at present there seems to be no sure method of differentiating these from the streptococci found in great abundance in clean soured milk."

Heinemann has pointed out that Bacillus lactis acidi of the Leichmann type is a streptococcus, for which Kruse has proposed the name streptococcus lacticus.

I believe that Heinemann's conclusion is correct in regard to B. lactis acidi being a streptococcus, but I do not believe that this streptococcus lacticus is identical with streptococcus pyogenes.

In 1903, Schottmueller[4] showed that streptococcus pyogenes produces small hemolysing colonies when planted in blood agar plates, whereas the pneumococcus and streptococcus viridans form small green or greenish colonies.

In 1906, I showed[5] that the hemolysing "streptococcus pyogenes" is only occasionally found in normal throats of human beings, but is always found there in tremendous numbers in tonsillitis and scarlet fever. On the other hand, an atypical streptococcus, forming green or greenish colonies in blood agar plates, was found to be a normal inhabitant of the healthy throat.

It has occurred to me, therefore, that it might be possible to differentiate in this way streptococcus lacticus, which commonly occurs in perfectly clean, soured milk from those streptococci which come from inflamed udders and milk ducts. In this study, streptococci were isolated both from market milk, and from samples of fresh milk which had been drawn by the writer into sterilized bottles, under aseptic precautions. Streptococci were easily isolated from 8 out of 17 samples of milk that were drawn into sterile bottles, under aseptic precautions. In addition to the cultures isolated from these eight samples of milk, nineteen strains which were isolated from eight samples of milk that had been drawn into an ordinary milk pail were included in this study, making a total of 35 strains.

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[1] Journal of the American Public Health Association, Volume I, November, 1911 p. 778.
[2] Journal of Infectious Diseases, 1906, Volume III, p. 173.
[3] General Bacteriology, Second Edition, 1910, p. 481.
[4] Munich Med. Wchnschr., 1903, L., pp. 849, 909.
[5] Jour. Infect. Dis., 1906, III, p. 755.

Read before the Laboratory Section, American Public Health Association, Havana, December, 1911.

Nine strains of this lot were found to produce small green colonies on blood agar plates, similar to those chain cocci found in healthy throats. Five of these nine were isolated from market milk and four were isolated from the milk of individual cows, which had been drawn into sterile bottles.

Eighteen strains that were tested produced very minute colonies which usually showed slight traces of hemolysis but often had a greenish tint. These colonies are very different from those of streptococcus pyogenes and are never confused with the latter after they have once been observed. These colonies have also been found in blood agar plates inoculated with material from healthy throats.

Eight of the strains included in this study produced colonies in blood agar plates which cannot be differentiated from colonies of streptococcus pyogenes. Four of these were isolated from the milk of a cow having a deep cut near the base of one teat. Milk spurted freely from this cut when the cow was milked. The cut was made by a barbed wire. Plates made with this milk, which had been drawn into sterile bottles and was used immediately, gave 290 colonies per c. c., more than half of which were streptococcus pyogenes. It is interesting to note here that the milk from one of the teats did not contain streptococci, but only staphylococci. Three of the strains which produced hemolysis were isolated from two samples of market milk. I visited one of these dairies and found there another cow having a cut in a teat, caused by a wire fence. The other dairy I have not had an opportunity to visit thus far.

The ninth strain among these hemolysers was isolated from the milk of an individual cow, which had been drawn into a sterile bottle but without disinfecting the teats and udders. I did not notice anything abnormal about this cow, but did not make a careful examination, neither did I inquire into her history. This work is still in progress and later I hope to get more information about this cow.

Conclusions:

I believe the following conclusions may be drawn from this study at this stage, subject to revision when the work is completed.

Streptococcus lacticus can be differentiated from streptococcus pyogenes by means of blood agar plates. The latter produces small colonies surrounded by a large zone of hemolysis, whereas the former produces green or greenish colonies with little or no hemolysis.

Streptococcus lacticus has no sanitary significance as it is found in nearly all samples of clean, soured and fresh milk, and very often in the healthy milk ducts.

Streptococcus pyogenes seems to occur but rarely in milk and is indicative of the existence of an inflamed condition of the udder of the cow. It seems likely, however, that these organisms may persist for some time after the inflammation has subsided, and that they may occur in mild inflammatory conditions

It would be interesting to know whether or not streptococcus pyogenes can be found in milk from a healthy cow, if it is drawn by a person having a tonsillitis associated with a cough. Further details about the cultures are given in the accompanying table.

TABLE SHOWING CULTURAL AND MORPHOLOGICAL CHARACTERS OF STREPTOCOCCI ISOLATED FROM FRESH MILK.

Dairy.	Manner of Collecting Milk.	Strains of Streptococcus.	Morphology.	Character of Colonies on Blood-Agar Plates.
Braseth	Drawn into pail.	1	Diplococci and short chains.	Green.
Cochrane ..	" " "	2	Cocci in chains.	Hemolysing.
Green	" " "	3	" " "	"
"	" " "	4	" " "	"
"	Drawn into sterile bottle.	5	" " "	Very minute, faintly hemolysing.
"	" " " "	6	" " "	Green.
"	" " " "	7	" " "	Very minute, faintly hemolysing.
"	" " " "	8	" " "	Green.
"	" " " "	9	" " "	
"	" " " "	10	" " "	Hemolysing.
Hobbs	" " " "	11	" " "	Green.
"	" " " "	12	" " "	Very minute, faintly hemolysing.
"	" " " "	13	Cocci elongated, long chains.	Very minute, faintly hemolysing.
"	" " " "	14	Cocci in chains.	Very minute, faintly hemolysing.
"	" " " "	15	" " "	Very minute, faintly hemolysing.
"	" " " "	16	" " "	Very small, non-hemolysing.
"	" " " "	17	" " "	
"	" " " "	18	" " "	
"	Drawn into pail.	19	" " "	Very minute, faintly hemolysing.
"	" " "	20	" " "	Very minute, faintly hemolysing.
"	" " "	21	" " "	Green.
McD.	" " "	22	Diplococci and short chains.	Very minute, faintly hemolysing.
"	" " "	23		
"	" " "	24	Diplococci and short chains.	Very minute, faintly hemolysing.
"	" " "	25		
McV.	Drawn into sterile bottle.	26	Cocci in chains.	Hemolysing.
"	" " " "	27	" " "	"
"	Drawn into pail.	28	" " "	"
	" " "	29	" " "	"
Nelson	" " "	30		Very minute, faintly hemolysing.
"	" " "	31	Diplococci and short chains.	Very minute, green.
Richards ...	" " "	32	Diplococci and short chains.	Green.
" ...	" " "	33	" " "	"
Warren	" " "	34	Short chains.	Green.
"	" " "	35	Cocci in chains.	Very minute, slightly hemolysing.

All cultures when planted upon serum—glucose—agar turned the media white and opaque. According to Libman (Jour. Med. Research, 1901, I, p. 84) this reaction may be used to show that the organisms belong to the streptococci and not to the pneumococci.

THE LABORATORY AS A PROPHYLACTIC MEASURE

JULIO F. ARTEAGA, M.D., Havana, Cuba.

It is no easy matter, in these days of multiple and cheap communication between foreign countries, to maintain a close sanitary watch over all intending immigrants. Yet, it must be admitted that the system established at Hamburg, of keeping under observation until they embark all emigrants that sail from that port, is an ideal one; but we must remember that such a step entails no small expense and probably, not all European nations would be willing to follow the German example.

The usual method of sanitary inspection of passengers, immigrants or others, either at sea-ports or in some small town near the boundary line, is well known to all who have travelled. A rapid survey of each passenger, in some unsuitable building or on board the steamer or railway-car, looking out especially for some signs of eruptive fevers or general weakness, occasionally taking the pulse and rarely, the introduction of a thermometer, is as a rule, the sum total of the average sanitary inspection of passengers.

Who can tell with any degree of certainty that all those passengers so examined, are not sufferers of some latent pathological condition?

In the case of first-class or Pullman-car passengers, that is, persons of the well-to-do class, the danger from future trouble is less than with the poorer class, which usually travels in the steerage. The danger is less, not only because such travellers are more intelligent and know when they should call for medical aid, but also because they have the means of paying for such aid. In the case of the steerage or immigrant class of passengers the reverse is the case. Generally they are stupid and of course, badly off financially. It is for the latter class that measures must be taken, in order to prevent them bringing in diseases to the country where they intend to settle.

Before an immigrant is allowed to enter freely into a country he must first stay for a certain period of time at an immigration depot, where supposedly he is to be studied—physically at least—in order to determine if he be fit for admission.

The medical examination at the immigration stations should be carried out on more thorough lines than heretofore. Formerly it was sufficient to examine for trachoma, leprosy, small-pox or some disease of that sort, but no attempt was made to diagnose latent tuberculosis, quiescent malarial infection, and cholera spirillum—or typhoid bacillus-carrier.

It is here, at these stations, that a well equipped clinical laboratory could render most valuable service. Indeed, it could act as a prophylactic measure. Had it not been for such a laboratory, the health authorities of the State of New York recently would have been at their wits' end, to stamp out cholera.

Read before the Municipal Health Officers' Section, American Public Health Association, Havana, Cuba, December, 1911.

Instead, thanks to the laboratory, the passengers infected were correctly diagnosed and the non-infected were allowed to proceed without further molestations.

The routine examination of the immigrants' feces, at least once, might reveal for example, the Eberth bacillus or the ova of uncinaria.

I could quote two cases in my experience, which came under the notice of our Commission for Infectious Diseases, and which, or rather, the failure to do so, illustrate the value of such timely examination, and advisability of the procedure.

One of the cases was that of a young Spanish girl, who a few days after her arrival from Spain, was taken sick. Several erroneous diagnoses were made and of course, faulty treatment given. She was finally taken to "Las Animas" Hospital, and died there. A few minutes before her death the microscope revealed in this patient's excreta, a considerable number of the ova of *ascarides lumbricoides.*

The other case was that of a Spanish laborer, a recently arrived immigrant. A few weeks after his coming, he was brought to "Las Animas" Hospital and died before proper treatment could be given him. Here again, the microscope helped in the diagnosis, because a few hours before the end, the presence of *amoebae* in the excreta were shown microscopically.

I am fully convinced, that had those two cases been subjected to a thorough clinical and laboratory examination at the immigration station, those deaths at least, might have been averted. But in this connection, one point should not be overlooked, and it is, that not only should laboratories be established at quarantine or immigration stations, but they should have proper and efficient employees to carry on the work in the best scientific manner. This is a question that deserves our earnest attention as health officials, because our duty should be to lean more to the prevention of disease, than to lessen mortality and morbidity rates.

All nations take precautions against undesirable immigration, both from the moral as well as, from the physical standpoint. The anarchist, who is considered a moral wreck, because he brings the germs of social discord and dissolution; and the weak immigrant, who is a physical wreck, because he is incapable of having a robust progeny. Both are undesirable. I further hold that the same objection should be raised against those individuals, healthy in appearance, but who are nevertheless physiological wrecks, because laboratory methods have shown, that they carry within themselves pathogenic germs, which are harmful to the community.

NEW METHOD OF SEWAGE SLUDGE TREATMENT

Rudolph Hering, D. Sc.

I shall introduce this subject by recalling the fact that the American Public Health Association since its origin has witnessed the advance of sanitation engineering in its various branches to an extent which had not been achieved during centuries before.

The question of water supply at the time of organization of this association, was still surrounded by a great deal of darkness so far as practical guarantees of the results were concerned, but during the last 30 years we have come from a state of uncertainty to one of knowledge. To-day, sanitary engineering is in a condition to predict even what we were incapable of doing only four or five years ago. For instance, last winter in Montreal and Philadelphia was the first one in their history when the usual typhoid rise in the death rate was eliminated. In Montreal since the time when they began to record deaths, there was always a greater number during the winter months. Philadelphia last winter, had still one district that was not supplied by filtered water and there had been the usual increase in the typhoid deaths. But last winter in both cases, the cause was eliminated by disinfecting the water by a minimum dose of hypochlorites, and the usual rise in cases was entirely prevented.

Also with the garbage question, which this association itself took up, good progress has been made. Whereas only 25 years ago this subject was practically in chaos, to-day it is possible to accomplish the desired results of preventing sickness and nuisance by the best works as they are now built and operated.

Before coming to the special subject I was going to speak about, I wish to say that there is another one pertaining to Sanitary Engineering which is coming to the front and which this association will undoubtedly take notice of. I mean the question of ventilation and air supplies, which has not yet reached the stage of precise knowledge, either theoretically or practically. This is about in the same condition as was that of garbage disposal when the association first took hold of it. A great deal of work can be done in that direction and a great deal of doubt and mystery needs to be cleared up. All that is necessary is to get together and earnestly pursue the subject until we have the needed light.

The subject I wished to speak about to-day is an advance made in that branch of sanitary engineering which relates to sewage disposal, namely the treatment of sewage sludge which had not been very satisfactorily solved until within a very few years. Not until quite recently have we been able to say that we can dispose of sludge, so that from beginning to end there need be no nuisance connected with it and in such a way that the disease germs contained in it will presumably be destroyed.

So far as the development of this branch of sanitary engineering is concerned, the first country to take it up was England, because England is a small country with a large population and very small rivers. For 30 to 40 years past, England has been laboring with this question. In the endeavor to find a satis-

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Read before the American Public Health Association, Havana, Cuba, December, 1911.

factory solution, sanitary engineering has separated the question into two parts, and not until that was done could we make much headway. In the first place, we should prevent disease and in the second place, we should prevent a nuisance. Not until we could separate the question in this way, could we meet satisfactorily the sanitary dangers.

The best way of eliminating disease germs from sewage is by the use of sand filtration. But there is not enough sand near all cities for the use of this system. We have now, only two cities that have large enough areas of sand, namely, Paris and London. The others must do something else. Now all the large cities on the sea coast or along large rivers naturally put their sewage into the ocean or rivers. This is done because it is found cheapest and if properly done, the nuisance is prevented. But we are not quite sure whether diseases are also prevented, particularly in cases where oysters are raised and food-fish are taken. In general, however, the subject of sewage dilution is to-day considered a safe as well as sanitary means of oxidizing the sewage matter discharged into the same. Precisely the same as the disposal of foul air by dilution in buildings and without, it is a legitimate method of sewage disposal, with the only difference that there is less oxygen available in the water for oxidation than in the air, and that therefore, the process of oxidation will take longer and, due to other reasons, offer more difficulties.

Before much progress could be made in sewage purification, it was found necessary as a fundamental proposition, to separate the sewage into liquids and solids so as to get a more economical solution of the process. Liquid matter can best be purified by oxidation, but not the solids. These must be treated in another way and it is of the treatment of solids that I wish to speak.

This question has always been the bête noir of the whole subject from the fact that the solids were chiefly instrumental in creating the nuisance. Everywhere there was an offensive odor and there seemed to be no way of preventing it. England had tried to do this for over 30 years, and everyone wanted the sewage works as far away as possible, on account of this nuisance.

At last this pressing question has been solved; it was done by the work of Dr. Imhoff in the Essen District of Germany. I have seen a number of the works and there is absolutely no odor about them. The solution of the question has been accomplished by allowing the sludge to settle out of the sewage when passing through a tank, where it was retarded in its flow, sufficiently to allow it to pass through the tanks within one and a half and two and a half hours. This causes the sewage to be practically as fresh when it leaves the tanks as when it enters them.

In order to prevent the rising of gas bubbles within this tank, resulting from the decomposition of the sludge, and passing up through the arriving fresh sewage and, while mixing with it, to prevent loading it with particles of putrescent matter, Dr. Imhoff has suggested a double tank. The upper one is confined to the flowing sewage, and the lower one to the accumulation and rotting out of the sludge.

A narrow horizontal slot at the bottom of the upper tank, which is made of sloping sides, is so arranged that the suspended particles will slip through it into the lower tank, and that the gas bubbles originating in the lower tank will not rise through the slot, but remain practically in the same compartment which is independently extended by shafts to the surface. The sludge after its thorough decomposition is drawn out at the bottom of the lower chamber and rises automatically to within several feet of the elevation of the surface of the water. It is then allowed to run out and spread over drying beds. The fact that the gas contained in the sludge was under pressure, the gas bubbles thus relieved of the pressure, expand and cause the sludge to become porous and light. This allows it to drain and dry within a few days, whereas it took months for the sludge from the usual tanks to dry. The unstable and non-resistant organic matter has all been converted chiefly into gases and therefore the sludge is practically non-odorous. It closely resembles forest soil.

Within the two tanks, the process of decomposition is confined to the activity of chiefly two classes of bacteria, neither of which produces gases which have any odor. These gases are marsh gas and carbon dioxide, of which the former constitutes about three-quarters, and the latter about one-quarter of the total quantity of gases escaping.

The reason for the prevalence of these two gases is probably due to the extinction of all bacteria producing other foul smelling gases, sulphureted hydrogen being the chief one. This extinction again is due to the fact that the fresh sewage does not flow over the sludge deposit and bring other bacteria of the sewage to it. It seems a question of the survival of the fittest to take possession of the field and not to allow the other forms of bacterial life to gain prominence.

It takes the sludge several months, after starting the works, to get ripe and to have these two species of bacteria prevail. It then takes from two to four months' time for the sludge to be thoroughly decomposed and before it can be drawn off at the bottom.

The tanks are with preference made from 25 to 30 feet deep, not only to cause the compression of the gases which facilitates subsequent drying of the sludge, but also to allow the escaping gases to pass through as deep a mass of the sludge as possible, so as to stir it up. This stirring not only tends to remove the toxins, but to expose fresh surfaces of sludge to the bacteria and thereby to increase the speed of decomposition.

There are now about 30 Imhoff tanks already in existence and in operation in Germany. While at first many doubts were raised concerning the process, these doubts have almost entirely been removed. At the recent hygienic exposition in Dresden, this new process of sludge treatment was practically the only one that was represented and only favorable comments were made by those who had examined the originals in actual operation.

MUNICIPAL INSPECTION OF FOOD SUPPLIES

JAMES O. JORDAN,

Bureau of Milk Inspection, Boston Board of Health.

The supervision of the food supply of Boston by the Board of Health is entrusted to several sub-departments, all responsible to the board. These are known as the Division of Inspection of Provisions; Division of Sanitary Inspection; Dairy Division; Bacteriological Laboratory, and the Bureau of Milk Inspection with its chemical laboratory.

The Division of Inspection of Provisions has oversight of slaughtering establishments (in which no inspectors from the U. S. Bureau of Animal Industry are located), of sausage factories, egg breaking establishments, preserving factories, fish smoking and lobster boiling places, and has general charge of shops where groceries, provisions, fish, fruit and vegetables are sold. The board has authority to seize and condemn diseased and tainted food, and this right is exercised whenever warranted by existing conditions. In addition to this work much consideration is given by this division to the sanitary feature of the various establishments visited. Prosecutions are instituted for the sale of articles unfit for food, and for unclean stores.

The Division of Sanitary Inspection has the sanitary supervision of shops where milk is sold, and upon its reports are based the granting or refusal to issue milk licenses to store dealers by the milk inspector. Bakeries are also inspected by this division, with a view to the installation of improvements in cleanliness, lighting, ventilation, water closets, and drainage. These establishments are whitewashed every three months and a continual supply of hot water must be provided. Ice cream manufacturies and shops where this product is sold are also overseen by this division in an endeavor to compel the provision of better sanitary facilities. In addition to the above many miscellaneous complaints are investigated.

The Dairy Division is charged with the supervision of all farms where milk is produced, also of all places where milk is handled (exclusive of stores), and stored for subsequent sale within the city.

The Bacteriological Laboratory makes examinations of miscellaneous food materials received from other divisions, such as milk, ice cream, butter, eggs and meats.

To the Bureau of Milk Inspection is entrusted the execution of laws relating to milk, butter, oleomargarine and vinegar. The regulations of the board which deal with the quality of milk and ice cream are enforced by this division. In the chemical laboratory examinations of the above products are made, and in addition a limited number of investigations of foods, such as fish, meats, fruits, ice cream cones, etc., submitted by other sub-departments.

Without entering into details concerning the results which have attended this work, as carried on under the direction of the Boston Board of Health in the various divisions, it can be stated that what successes have been achieved

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Read before the Municipal Health Officers' Section, American Public Health Association, Havana, Cuba, December, 1910.

can be attributed to the definite policy pursued, namely, that of, first, inspections; second, laboratory examinations; third, education; and fourth, prosecutions. For the inspection service records are kept either by filing cards, score cards, or similar devices, and follow-up systems with subsequent re-inspections are employed in the endeavor to correct faulty conditions. Speaking generally, it can be stated that this plan has and is yielding pronounced improvement. The basic principles for laboratory work are betterment of quality of foods from the health standpoint and lessening of opportunities for the purveyor of fraudulent products. For the educational propaganda, circulars, cards, notices, letters interviews and personal advice during inspection trips are utilized to the greatest extent. Whenever opportunity offers exhibits are made which illustrate and place before the public the extent and necessity for the work which the board is pursuing. In these endeavors, object lessons, photographs and printed matter play no inconsiderable part. Lectures and talks are also given, but to a limited extent. Prosecutions are rarely instituted for faulty sanitary conditions, unless there is proof that no other means will yield the desired results. In all instances an endeavor is made to bring the regulations of the board to the attention of the interested individuals. Prosecution, however, invariably follows the serious infringement of laws like those relating to milk products, and the instituting of 470 cases in a single year by the Bureau of Milk Inspection, with fines aggregating $6,075.40, gives an idea of the extent of this work.

While the efforts of these divisions have been followed by marked improvement, the extent of this gain would have been more pronounced under conditions which would lead to strict compliance with the promulgations of the Board of Health. The chief difficulty has been that of lack of authority to enforce demands. At the present time the legality of many of the regulations of local boards of health in Massachusetts are in serious doubt. This is a state of affairs which renders effective work impossible and unsatisfactory, and should be immediately corrected.

As an outcome of Boston's experiences in municipal food inspection, the following conclusions and comments are submitted for the more efficient handling of those problems over which boards of health are ordinarily supposed to have supreme control.

1. It is suggested that all restaurants, ice cream plants, sausage factories, egg breaking, preserving, fish smoking, and lobster boiling establishments be licensed by boards of health, with authority to frame rules for the government of the above places, as well as to revoke said licenses.

2. That boards of health have authority to prohibit the exposure of certain foods; to require that all stores where foods are sold shall have proper lavatory facilities; and that no store where articles of food are sold or prepared shall be used for domestic purposes, or open directly into living rooms, and that the water closets in such stores shall be properly located.

3. At the present time inspected and stamped meats, as well as uninspected and unstamped meats are on sale in Boston. To obviate this unsatisfactory condition, it is recommended that all animals be inspected at the time of slaughter by a competent and officially appointed authority and the carcasses properly stamped.

4. The Massachusetts law requires calves to be four weeks old and to weigh forty pounds before slaughtering. As the laws of different States vary materially in this respect, and as the principle of arbitrarily fixing by legislation the time when veal becomes a suitable food is a mooted question, this subject if it is to continue to be governed by legal measures, should at least be controlled by a uniform law. Such law, regardless of whether it is based on age or weight, should require the carcasses of all calves which are to be employed as food to be free from disease.

5. Inspectors of milk issue milk licenses, and have the right to refuse them to persons not deemed "suitable" to deal in this product, but a license once granted cannot be revoked, even if the holder should later be considered unsuitable to continue to handle this commodity. Authority for such revocations should, however, be vested in inspectors of milk or boards of health; this power of revocation being deemed of more importance than the right of refusal.

6. Dairy inspection by some State authority appears desirable in place of local inspection. This plan would prevent duplication and lessen expense, as well as friction with producers, which is likely to follow inspections by more than one agency.

7. The hygienic and sanitary oversight of the production of milk should relate not only to the use of this commodity as milk, but also when utilized as cream, butter, cheese, or as food in any other form. Such control should include the licensing or issuance of permits to producers, with power to revoke for cause said permits.

I desire to thank Dr. Samuel H. Durgin, chairman of the Board of Health, Dr. P. H. Mullowney, Health Commissioner, Dr. Alexander Burr, in charge of the Division of Inspection of Provisions, and Mr. Thomas Jordan, in charge of the Division of Sanitary Inspection, for assistance and suggestions in the preparation of this paper.

REPORT OF THE COMMITTEE ON THE STUDY AND PREVENTION OF COMMUNICABLE DISEASES

Owing to the unexpected resignation of Dr. W. A. Evans, the Chairman, and the consequent confusion entailed at the last moment, your committee is unable to present a full report.

Dr. Evans assigned work upon different diseases to different members of the committee, but much of the material was received too late to be available and in many instances it has been impossible to do more than make a very imperfect compilation of the facts.

For these reasons it seemed best to confine the report to a very short resumé of some of the more important work which has been done in the investigation of methods of prevention of communicable disease during the past few years.

Your committee offers no suggestions in regard to the value of terminal room disinfection as a means of prevention, as it is understood that another committee has this question under consideration, and it is useless to duplicate work. For the same reason nothing has been said in regard to anterior poliomyelitis and many other diseases.

With this explanation your committee presents its report.

GENERAL CONSIDERATIONS IN REGARD TO PREVENTING THE SPREAD OF INFECTION.

The first necessity in the attempt to control the spread of infection is a knowledge of how it is spread.

In general there are three theories in regard to the manner in which infection is transmitted; these are, by means of the air, by means of contact and by means of fomites.

The results in controlling infection in those hospitals where cases of different communicable diseases are treated in the same ward separated only by a screen or a barrier of tape, or in the so-called cubicles, seem to show that infection is transmitted by means of contact rather than through the air.

By "contact infection" is meant the transmission of infection by means of a person or article which has been very recently in contact with the patient or his fresh discharges, as well as by direct contact with the patient himself, by kissing, etc.

In all these hospitals what may be called "aseptic nursing" is practiced, and the same nurse cares for cases of different diseases, taking certain precautions to prevent the spread of infection by contact.

The work is just beginning in the United States and Germany, but in England and France there are a number of such hospitals.

The results are noteworthy. In the North Eastern Hospital in London, a cubicle hospital, during two years only 16 cases of cross infection developed among 1,290 patients.

Read before the Municipal Health Officers' Section, American Public Health Association, Havana, Cuba, December, **1911.**

In the South Western Hospital, a cubicle hospital, during 18 months 20 cases of cross infection developed among 704 patients.

In the Plaistow Hospital, where both the cubicle and barrier systems are used, there has been no case of cross infection in three years among the cubicle patients. No figures are yet available for the barrier work.

In the United States in the Providence City Hospital, Providence, R. I., built under the supervision of Dr. Charles V. Chapin, Superintendent of Health, and a member of this association, a hospital where the separate room and the barrier systems are both employed, the figures for 18 months ending September 1, 1911, show that 7 cases of cross infection developed among 365 patients in the rooms. In this hospital the rooms open onto a common corridor and the doors are always open, the nurses going from case to case. No disinfecting solutions are used for the hands.

These figures, which show fewer cases of cross infection than in many isolation hospitals conducted under the old system, make strong evidence against the theory of air borne infection.

By transmission of infection by means of fomites is meant its spread by means of articles which retain the infection for a considerable period of time.

Many facts go to disprove this theory: thus in yellow fever, increased knowledge has taught that it is not transmitted by fomites as was formerly universally believed, and the same is true of many other diseases.

In still other diseases, as typhoid fever and diphtheria, infection which was formerly believed to be due to fomites is now known to be due to carrier cases, that is, to contact infection.

It is by carrier cases also that many facts in regard to the apparent failure of isolation to prevent infection, can be explained.

It has been shown that prompt isolation and removal to a hospital of cases does not necessarily reduce the percentage of incidence, as was expected. In fact, in some cities where removals to a hospital reached as high as 60 per cent. of all cases reported, the percentage of incidence remained high; in some instances higher than in cities where the percentage of removals was much lower, and the disease was by no means stamped out.

In spite of this, isolation must remain for the present the chief means of control, and indeed in certain instances, isolation is of great value. When a disease suddenly appears in a community from which it has been long absent, prompt isolation of cases has a marked influence in controlling its spread and should be carried out rigidly. In such communities the number of carriers is small, and the main sources of infection are the patients themselves, but where a disease has been present for a long time, carriers must be numerous and for this reason, isolation does not have such a marked effect in controlling the spread of infection.

It appears then that the chief means of spreading infection is not through the air or by means of fomites, but by means of contact either with carriers or the patients themselves.

It is also impracticable to prevent the spread of infection by means of carriers owing to the impossibility of restraining such cases.

Typhoid Fever.

Little can be done in preventing the occurrence of typhoid by isolation of the sick, on account of its spread by means of carriers, but the use of anti-typhoid vaccination has shown its value in this work. While the use of protective vaccination by means of the injection of living bacilli is theoretically of great value, there are certain objections to its use. One question which has arisen is whether the injection of living bacilli might not turn the subject into a carrier. As injection with vaccines from dead bacilli or of bacillary extracts is not open to such an objection, the former is the best to use at the present time. A clear statement of the present status of anti-typhoid vaccination is to be found in the report of the commission appointed by the Academy of Medicine of Paris.

A brief summary of its conclusions is as follows:

The results of anti-typhoid vaccination are such that it should be urged upon all who are likely to be exposed to infection.

Its benefits are shown by the fact that a comparison between those who are protected by vaccination and those who are not, shows that case incidence in the former is at least one-half that in the latter. Those among the vaccinated who contract typhoid have much milder attacks than the unvaccinated and moreover the case fatality among the former is one-half that among the latter.

The immunity conferred appears to last from one to four years. Anti-typhoid inoculation is without danger to the subject.

The inoculation is followed by a period of greater susceptibility to infection; a period which may last from one to three weeks. For this reason inoculated persons should take especial care against exposure to infection during this period, and it is unwise to allow persons to take the inoculation during an epidemic when there is greater danger of infection.

The inoculation should not be given to a person who is apparently incubating typhoid, or at the beginning of an attack. The subject should preferably be healthy and free from organic or chronic disease, especially tuberculosis.

One practical fact connected with anti-typhoid vaccination should not be forgotten, and that is that persons who have been immunized in this way, carry a positive Widal, a fact which may be of importance in future diagnosis on the subject. It is well to ask if your patient has previously taken an anti-typhoid vaccination.

At present anti-typhoid vaccination must be voluntary and it is suggested that health officers urge physicians to recommend its use among their patients.

Measles.

Little has been accomplished towards the control of this disease. Measles is one of the most difficult of the commoner diseases of childhood to control on account of its great infectiousness and for the reason that parents pay little attention to protecting their children from its attacks, believing that it is a necessary evil of childhood, and that the sooner a child has it and is done with it the better for all concerned. Education of parents has little or no effect, nor does it seem to affect its spread whether patients are strictly isolated or simply excluded from school without isolation.

In a recent article Dr. R. Davison, Medical Officer of Health, Maldens and Coombe, urban district in England, gives his experience with measles during 15 years.

'It is the custom to close the schools promptly at the outbreak of an epidemic; to instruct the teachers in regard to the dangers of the disease and of the necessity of reporting all cases at once; to send a leaflet of instructions to every family where a case occurs and to disinfect with formalin the school and every house where a case occurs.

His conclusions are that:

Instruction of the teacher has no effect in controlling its spread. Closing the schools has no effect in controlling its spread. Disinfection has no effect in controlling its spread. Notification is of value in leading the inspectors early to the locality where the disease exists and getting the cases under treatment early and so lessening the case fatality.

Scarlet Fever.

An attempt was made to learn if there was any uniform procedure among health officers in regard to scarlet fever, and with this object in view a circular letter was sent to 143 cities in Canada and the United States asking for information. Eighty-seven replies were received from health officers to whom 52,620 cases of scarlet fever were reported during 1910. It would take too long to give an analysis of all the points covered by the replies but a few are of interest.

Sixty-four cities have a minimum period of quarantine which varies from 10 days to six weeks. In 39 cities all the members of the family are segregated during the continuance of the disease, and in 81 the well children are excluded from school as long as the patient is ill and for a varying period after recovery.

All cities that replied placard the house during the continuance of the disease and 77 require a more or less rigid isolation of the patient in a separate room. However, only 59 make inspection to see if the requirements of the board of health are obeyed, while six rely upon reports of neighbors, and 22 make no attempt at inspection. In 50 cities the board of health inspects the patient after the report of recovery, before release, while the remainder rely on the report of the family physician. The cessation of desquamation is the sign of readiness for release in 59 cities, although 56 pay some attention to the condition of the nose and throat.

Only four will release a patient when nose and throat appear normal, paying no attention to desquamation, and 11 will release when desquamation has ceased even though a nasal discharge exists.

Terminal room disinfection is compulsory in 83 cities and in 78 of these it must be done by the Board of Health.

In all but three where disinfection is compulsory, some form of formaldehyde, either liquid or solid, is used. Of the exceptions one uses chlorine gas, one sulphur, and one cleans with a solution of bichloride of mercury, strength not stated.

The amount of disinfectant used per 1,000 cu. ft. varies from 6 to 32 oz. of the liquid forms, the majority using 16 oz. or under, and from 1 to 2 oz. of the solid form; the room being closed from 6 to 48 hours.

Fifty-one health officers believe that infection is carried by scales of desquamation, 19 are doubtful and 13 do not so believe. Thirty-eight believe that infection is carried by fomites, 16 are doubtful and 29 do not so believe. Four did not reply to either question.

The question of where the infective principle resides, whether in the scales of desquamation or in the nasal and buccal discharges, is still an open one although an increasing number of observers believe that it resides in the latter rather than the former.

In England, where more work of this kind seems to have been done, it has been found that, by discharging patients when the throat and nose appear normal, without regard to desquamation, the average stay in hospital was reduced from 45 to 29 plus days without any increase in the percentage of return cases.

Observations in this country seem to show that patients with a nasal discharge but free from desquamation invariably cause return cases soon after release, while patients who are desquamating but free from nasal discharge do not so cause return cases.

Not much work on immunization against scarlet fever has been done in this country but the figures from Russia seem to show a diminution of case incidence among immunized patients amounting to about one-half that among the non-immunized. In this country the results in the Chicago Contagious Disease Hospital, as reported by Dr. Biwer at the Milwaukee meeting in 1910, were such as to encourage a continuance. No figures are yet available for later work. The immunity appears to last about three months. Other observers report a diminution of case fatality of one-half among patients with scarlet fever, treated with streptococcus vaccines.

Your committee would suggest further observations of the value of streptococcus vaccine in the treatment of and immunization against scarlet fever.

It is also suggested that further observations be made upon the question of the transmission of infection in scarlet fever, whether by the scales of desquamation or by the nasal and buccal discharges. This may be done by making a careful study of all instances of return cases and learning whether the infecting case was desquamating or had a nasal discharge or both, and also whether it developed a "cold" shortly before the illness of the return case.

FRANCIS GEORGE CURTIS, M.D.,
Acting Chairman.

THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH, BOSTON, MASS., ANNUAL MEETING

(Abstract of Proceedings.)

The annual meeting of the Massachusetts Association of Boards of Health was held at the Hotel Brunswick, Boston, Thursday, January 25, 1912, with Vice-President Samuel H. Durgin presiding.

The following lists of applicants for membership approved by the Executive Committee were elected to membership in the Association: Dr. George L. Jones, Wellesley; Dr. Thomas H. Sanders, Webster; Dr. Patrick H. Mullowney, Boston; Dr. James J. Gallivan, Boston; Prof. George C. Whipple, Harvard University.

REPORT OF TREASURER FOR 1911.

Receipts

Balance from 1910	$1,380.32
Annual assessments	559.00
Interest	26.78
Total receipts	$1,966.10

Expenses

Subscriptions to Journal A. P. H. A.	$231.75
Reporting meetings, etc.	110.99
Clerical assistance to Secretary and Treasurer	17.50
Printing for Secretary and Treasurer	78.37
Printing for committees	9.25
Cigars and lunches	38.40
Treasurer's bond	4.00
Total expenses	$490.26
Balance in hands of Treasurer	1,475.84
Total	$1,966.10

Of this balance $1,000 is in the West Newton Savings Bank, drawing interest.

Respectfully submitted,

Francis Geo. Curtis, *Treasurer.*

Dr. Curtis. I might say, that owing to the change last year in the annual dues, by which half was for payment of the subscription to the Journal and half for the annual dues, we shall have rather a smaller balance this year than we should have, because many men, who rather delayed in paying their annual assessments, received numbers of the Journal and then afterwards decided they didn't wish the Journal because they got it in other ways. So that we have carried quite a number of unnecessary subscriptions to the Journal. I would ask this year that gentlemen who do not wish to subscribe for the Journal would let the Treasurer know at the earliest moment, so that the list can be revised.

(On motion, the report of the Treasurer was received and placed on file.)

Pending Legislation

Dr. Curtis of Newton drew the attention of the association to House Bill 840, entitled, "An Act to Provide for Uniform Regulation of Diseases Dangerous to Public Health," and House Bill 841, entitled, "An Act to Provide for the Reorganization of the State Board of Health and to Prevent the Spread of Disease." After considerable discussion in which Drs. Stevens, Kennedy, Voss, Curtis, Barnes, Dionne, Durgin, Washburn, Messrs. Bolling, Packard and Kirshbaum took part, a motion by Dr. Curtis to the effect that the association go on record as opposed to these bills, was carried.

Mr. Newcomb of Salem made a motion that the association approve of House Bill 627, entitled "An Act Relative to the Exposure of Food Stuff to Insects and Animals." The motion was seconded and carried.

Mr. Coffey of Worcester made a motion that the association put itself on record as opposed to House Bill 843, entitled "An Act Relative to Appeals from the Decision of Boards of Health of Cities and Towns." The motion was seconded and carried.

Dr. Washburn moved that the chair appoint a committee of three to act as a Legislative Committee of the Association. The motion was seconded and carried.

Committee Reports.

Mr. Bolling. The Committee on Milk Legislation desires to report that as directed at the last meeting we have introduced at the present session of the Legislature a bill somewhat similar to House Bill 350 of last year. The present bill is Senate Bill 141.

Dr. Palmer. I wish, briefly and verbally, to make a report from the Committee on Sex Hygiene of this Association. I regret that it is verbal, but it must be because our Secretary, Mr. Kreusi, has permanently removed from the city, and Dr. Chase of Brookline, who was to report in his place, is not present.

I will state briefly that this committee has attended to its business in a legitimate way. We have not made very much noise in doing it, but we have been accomplishing something. Our work has been chiefly through the issue of the pamphlets which I presume are familiar to you all. These leaflets or pamphlets are being inquired for in a great many places, and permission is asked for by other associations and boards of health for leave to print them in their own sections. Owing to the removal of Mr. Kreusi our headquarters for these leaflets at the present time is at 7 Hancock Avenue, under the jurisdiction of the State branch of the American Federation for Sex Education and Hygiene. Mr. Burtwell is the secretary of that committee. Your committee also, as they have had opportunity, have lectured on sex hygiene before such organizations as they could get a hearing before—such organizations as labor unions and women's clubs, and schools and colleges. I think I can say truthfully that the time never has been when there has been such willingness and eagerness to hear a proper statement of this tremendous question, put in a proper light. The people are wide awake, and I only hope to see the time come when venereal diseases will be required to be reported by physicians just as we report other dangerous and contagious diseases at present. The leaflets have also been reprinted in several different languages by the Rhode Island State Board of Health through Dr. Swarts, its secretary. I think that we have been accomplishing the object for which the committee was appointed If the work of the committee has met with approval of this association we respectfully ask that it may be continued along the line of its present endeavors. At first we had money from this association to print these leaflets but owing to our straightened financial situation that money has been cut off and it is now done by private subscription. In Rhode Island it is done under the auspices of the State Board of Health, and it seems to me it would be eminently fitting and wise for our own State to distribute these circulars as well as other information on other dangerous diseases.

It was moved and seconded the report be accepted as progressive and the committee continued. The motion was carried.

Papers Presented.

The following papers were then read:

The Prevention of Infant Mortality by Breast Feeding—Wm. H. Davis, M.D.

The Chemical Disinfection of Sewage—Professor Earle B. Phelps.

The Sanitary Regulation of the Oyster Industry—Professor F. P. Gorham.

(These papers and the discussion which followed will be found printed elsewhere in this copy of the Journal.)

Election of Officers.

The following gentlemen were elected officers for the ensuing year:

President—Henry P. Walcott, M.D.

Vice-Presidents—Samuel H. Durgin, M.D.; C. V. Chapin, M.D.

Secretary—James C. Coffey.

Treasurer—Francis G. Curtis, M.D.

Executive Committee—L. M. Palmer, M.D., South Framingham; F. G. Wheatley, M.D., North Abington; John F. Worcester, M.D., Dorchester; J. J. Goodman, M.D., Clinton; F. W. Taylor, M.D., Cambridge.

Dr. Denny moved that the chair appoint a committee of three to consider the question of changing the method of nominating officers. The motion was seconded and carried.

PUBLIC HEALTH NOTES

New York Academy of Medicine

The Public Health, Hospital and Budget Commitee of the New York Academy of Medicine has outlined a program to be followed out which is of such scope that it should have a very important effect on improving the public health and hospital conditions of that city. The following are the more important purposes of the Committee:

I. Public Health.

a. To maintain a bureau for the collection of facts in regard to public health, sanitation and hygiene.

b. To endeavor to establish an active cooperation with all public health activities in the city.

c. To keep the medical profession advised of current public health conditions.

d. To render to the public authorities and to the community at large an authoritative medical opinion on public health matters. This is to include frequent conferences with officials of various city departments, the holding of public meetings, the giving of lectures, the distribution of literature, and other methods of publicity.

e. To undertake and suggest special researches looking to the solution of vital public health problems, such as an investigation of industrial diseases, etc.

f. To make a comparative study of methods and results of public health activities in other cities, both in this country and abroad.

II. Municipal Budget.

a. To utilize facts obtained by the study of public health and hospital conditions for practical application in the preparation of the annual municipal budget.

b. To assist actively the various departments of the city government which relate to public health and hospitals in the preparation of their tentative budgets.

c. To take active part in the budget hearings before the Board of Estimate and Apportionment.

III. Hospitals.

a. A study of hospital and dispensary conditions in New York City, including public and private institutions in all the boroughs. This study to be made from a standpoint of: (1) Construction; (2) Equipment; (3) Administration; (4) Medical efficiency.

b. To plan for the future development of hospitals and dispensaries according to the distribution of population and to further the efforts already being made to raise the standards of dispensary work.

c. To undertake a comparative study of hospitals and dispensary conditions in other cities, both in this country and abroad.

A gift from Mrs. E. H. Harriman has made it possible to carry on the investigation in a thorough manner. Dr. E. H. Corwin is to direct the work of the committee.

Rural Tuberculosis

Tuberculosis is frequently called a city disease, and much of the work of anti-tuberculosis associations has been carried on in the more populous places. A very careful study of rural tuberculosis has recently been made by the Wisconsin Anti-Tuberculosis Association. (The Crusader, Wisconsin Anti-Tuberculosis Association, February, 1912.) This organization, recognized as being one of the most progressive of its kind in the United States, has made an intensive study of tuberculosis in Dunn County, Wisconsin. This county was chosen for the investigation because it presented a fair type of Wisconsin agricultural county in which the death rate from tuberculosis is not out of proportion to that of the State at large. Conditions in this county were considered to be representative of the agricultural counties of the State.

The tuberculosis rate of the county as a whole was found to be remarkably stationary during the decade which was studied (1901-1911). It was demonstrated, however, that the rate had decreased markedly during this period in the city of Menominie (the only city in the county) but had correspondingly increased in the rural sections.

The investigators discovered that the city had slightly less house overcrowding than was the case in the country. The houses in the country were, however, found to be cleaner, but the ventilation to be much inferior. "Indeed, the deep seated superstitious fear of 'night air' is nowhere so generally embraced or so vigorously or unblushingly proclaimed." Lack of reporting cases by physicians to the local health authorities was noted. Not a single case was found to be reported, although this was made mandatory by the Wisconsin statute of 1907.

Disinfection of infected premises on vacation or death of the patient was found also to be rarely practiced. A number of cases are cited where the inference is that persons contracted the disease by occupying houses which had been previously occupied by consumptives but never disinfected. The common drinking cup is indicated as being more prevalent and dangerous in the rural districts than in the city, where there is an abundance of running water. In the former it takes the form of a dipper in the pail, which constitutes the water supply of the house.

The report points out that ignorance, lack of laws of sanitation and inefficient administration of public health precautions, combined with ignorance and incompetence on the part of a considerable percentage of physicians, contribute to bring about the serious condition which exists. The following is the concluding paragraph to this extremely valuable study:

"Whatever programme is employed in the solution of the rural problem, be it the establishment of local hospitals for advanced cases, sanatoria for the care of early cases, medical inspection of school children, common school instruction in hygiene, the reorganization of health departments with employment of inspectors, visiting nurses, lecturers and exhibits, it must be comprehensive enough to take into account every resident regardless of how far removed he may be from congested community life."

As far as we know, this is the first study of this kind that has been made in the United States, and great credit is due the Wisconsin Anti-Tuberculosis Association. The difficulties in obtaining the necessary data were considerable and entailed much hardship on the part of the investigators.

As another phase of the work of this organization it might be mentioned that largely through its efforts $153,666 have been appropriated by State, counties and cities for tuberculosis purposes since last June (six months).

Mosquito Campaign of Montclair, N. J.

"A campaign against mosquitoes is proposed by the Board of Health of Montclair, N. J. An appropriation of $2,000 to conduct the work during the summer of 1912 has been requested of and granted by the town council. The plan as thus far outlined is to employ a sufficient number of inspectors to cover the whole town in detail for the purpose of detecting and eliminating all breeding places. During the unusually dry summer of 1911, when it would normally be expected that mosquitoes would be few, they were unusually prevalent. This was attributed in part to the fact that the low water in the numerous brooks flowing through the town resulted in many scores of stagnate pools in which mosquitoes bred freely until they were discovered and breeding stopped."—Engineering News, Feb. 8, 1912.

Smoke Abatement

"The International Coal Smoke Abatement Exhibition is to be held in the Royal Agricultural Hall, Islington, London, England, from March 23 to April 4, 1912. Exhibits will be classified under smokeless fuels, domestic heating, other heating, various types of furnaces for industrial plants, testing appliances, fans and ventilating apparatus, and devices to prevent the emission of dust or dirt from chimneys. The exhibition will be held under the auspices of the Coal Smoke Abatement Society."—Engineering News, Feb. 8, 1912.

National Board of Health of Venezuela

In view of the interest regarding the establishment of a National Board of Health in the United States, the following, taken from the Bulletin of the Public and Marine Hospital Service of Jan. 5, 1912, is not without interest.

By an executive order of Gen. J. V. Gomez, President of the United States of Venezuela, of Nov. 13, 1911—a National Board of Health is established. The reason for the establishment of this national board as stated in the decree may be summarized as follows:

1. Sanitary measures to be effected, "must be established with perfect scientific rigor and practice, and in a regular way, stable and uniform throughout the country."

2. The need for better sanitary conditions, not only for the internal development of the republic, but for the fostering of foreign relations.

Royal Institute of Public Health

It is interesting to note that the next meeting of the Royal Institute of Public Health of England is to be held in July in Berlin, Germany. By such procedure mutual benefits should be derived by both nations. Public health work is indeed world-wide, and the discoveries and experiences of one nation, which will be valuable to others, are freely and willingly given.

Sanitary Engineering Section, A. P. H. A.

The Section on Sanitary Engineering of the American Public Health Association was successfully organized at a meeting held in New York on January 19, 1912. The constitution of the Section was adopted and the following gentlemen were elected:

Chairman, Mr. Rudolph Hering; vice-chairman, Col. J. L. Ludlow; secretary, Dr. H. D. Pease; recorder, Prof. Geo. C. Whipple. Members of the Council, Mr. Andrew J. Provist, Jr., Mr. F. A. Barbour, Mr. Langdon Pearse, Mr. Wm. Paul Gerhard, Mr. Frederic H. Bass.

The constitution provides for the appointment of Technical Committees by the Council of the Section. These committees shall embrace the sanitary engineering aspects of the following subjects, among others: Air supplies, water supplies, sewage collection and disposal, refuse collection and disposal, and such committees as are to report annually to the Section.

The qualifications for membership in this section as given in the constitution are as follows: "There shall be but one class of membership, the active. Sanitary engineers in the active practice of their profession, and other members of the American Public Health Association having or having had professional relation to the technical aspects of Sanitary Engineering, are eligible for membership in this section."

The introduction of this Section into the association is most important and will strengthen the association in many ways. Its advent has been most auspicious and great success is predicted for it. Members of the association with the necessary qualifications who wish to affiliate with the Section are invited to send their names to the secretary, Dr. H. D. Pease, 39-41 West 38th street, New York City.

Vegetables and Typhoid Fever

A recent number of Public Health Reports (Vol. XXVII, No. 6) contains a short article on "Vegetables as a Possible Factor in the Dissemination of Typhoid Fever," by R. H. Creel, in the Public Health and Marine Hospital Service. Dr. Creel refers to the previous work, showing the viability of the typhoid bacillus in soil, and comments upon the great variability of results obtained by different workers, and then suggests the possibility of uncooked foodstuffs, such as fruits and vegetables, as a means of conveying infections acquired at the time of cultivation to the consumer of such raw foods.

As no data are available on the subject, experiments were undertaken by the author to determine the possibility of this means of infection, and to test the viability of the typhoid bacillus on garden truck. Lettuce and radishes were the vegetables used in these experiments, which were carried on during a period from December, 1910, to April, 1911. The soil was inoculated with an emulsion of fecal material to which a 24-hour agar culture of bacillus typhosus was added, and subsequent treatment of the soil was by sprinkling to simulate rain.

Tests of the plants after the isolations of the typhoid bacillus were made, using Endo's medium and mannite litmus agar as culture media. The stems and leaves of the plants were the portions taken for the examination in order to avoid the sub-surface portion which might very easily be infected by adherent soil. In some instances the portions of the plants were washed with sterile broth and plated directly, while in other experiments the leaves and stems were rubbed directly on the plated medium. The examination of the developing colonies of characteristic appearance was carried out by planting in broth tubes and then incubating. After 24 hours a drop of highly agglutinative serum was added. If agglutination occurred the culture was replated and the resulting growth studied on different media. Confirmation was considered complete if the organism was a motile bacillus agglutinating in high dilutions, not liquefying gelatin, producing an acidity in milk not exceeding that caused by a known typhoid control, giving a negative indol test, and forming no gas on lactose broth.

The results of the experiments showed that on plants cultivated indoors the typhoid bacilli could be recovered after 25 days, on plants cultivated in the open air and exposed to rain and sunlight during part of the day, the leaves and stems showed typhoid bacilli after 31 days. Plants cultivated in the open air and exposed to sunlight throughout the entire day and to rainfall showed the presence of typhoid bacilli after 10 days.

Further experiments showed that the organisms adhere to the plant with a considerable degree of tenacity.

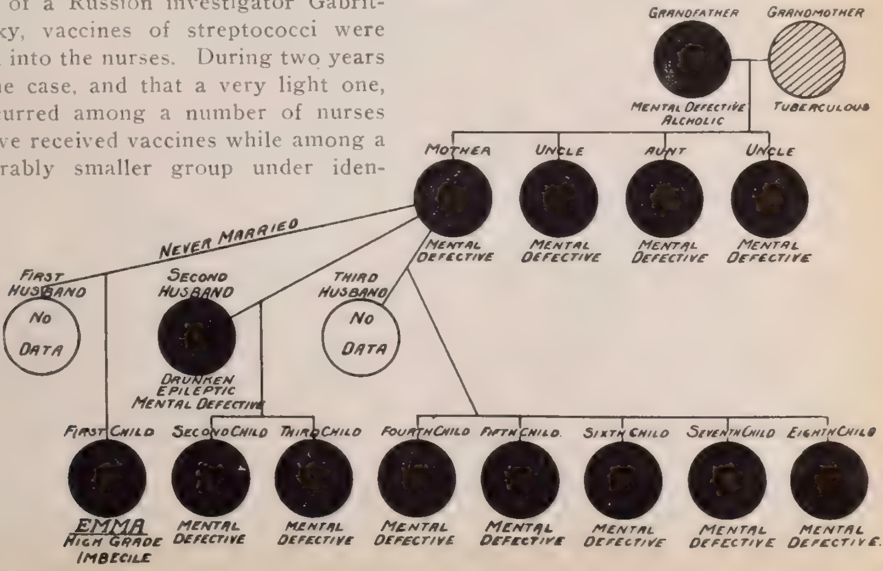
The conclusion to be drawn from this work is that vegetables, such as lettuce and radishes, if grown in infected soil, may serve as carriers for the disease germs though the plants themselves appear to be washed free from organisms, and the latter may endure for at least 31 days under some conditions, a period sufficiently long for some varieties of lettuce and radishes to mature. It is obvious, therefore, that the greatest care should be taken in the treatment of soils used for the production of such foods and in the cleansing of such foods for table use.

Scarlet Fever Prophylaxis

Dr. W. H. Watters gives the results of his experiences in immunizing nurses who have to attend scarlet fever cases. (Journal of the American Medical Association, Vol. LVIII No. 8.) Following the suggestion of a Russion investigator Gabritschewsky, vaccines of streptococci were injected into the nurses. During two years "but one case, and that a very light one, has occurred among a number of nurses who have received vaccines while among a considerably smaller group under identical conditions and environment (but not immunized), five times as many cases have occurred, and those not particularly light." Dr. Watters realizes "that it would be folly to attempt to draw any conclusions" from the small number of cases studied (36 nurses, 21 of whom were immunized and 15 not vaccinated) but points out that the results are suggestive.

The Right of Birth

An important symposium on "The Right to be Well-Born" appears in the Survey for March 2nd, 1912. Papers are contributed by Prof. Edward T. Devine, Franklin B. Kirkbride, Eleanor H. Johnson, Charles B. Davenport, Ph.D., Max G. Schlapp, M.D., Katherine B. Davis, Henry H. Godard, Ph.D., L. Pierce Clarke, M.D., Elizabeth S. Kite, Edward R. Johnstone and Charles S. Little, M.D. Various aspects of the relation between feeble-mindedness and general welfare are presented in a very telling and interest-compelling manner. It is pointed out that the greatest need of all is for more institutional care. As Dr. Devine states: "Biology and economics unite in demanding that the strains of feeble-mindedness shall be eliminated by the humane segregation of the mentally defective." The accompanying hereditary chart is reproduced to show graphically how the lack of proper institutional care of defectives may lead to the production of a large number of individuals who are feeble-minded and unfit to procreate.



Diphtheria Bacilli Carriers

Health officers are familiar with those cases of diphtheria which persist in giving positive cultures of Klebs-Loeffler bacilli for long periods. Anything which will aid in ridding the throat and nose of these organisms is to be looked upon as of great practical value. In 1909 Schiötz reported that in a number of cases of chronic carriers of diphtheria bacilli, he was able to rapidly eliminate the organisms by treating the throat and nose with cultures of Staphylococcus aureus. Dr. Lydia M. DeWitt has carried on further experiments in this subject the results of which are published in the Journal of Infectious Diseases for February. As a result of these investigations Dr. DeWitt concludes that it seems "advisable and effective to treat slowly convalescing diphtheria cases and diphtheria carriers with Staphylococcus aureus culture." She, however, cautions against the use of this method before the mucous membrane of the throat has become intact on account of the danger of invasion of the deeper tissues by these pyogenic bacteria. Two negative cultures are not always to be considered sufficient before discharging the patient after this treatment, as there may be a reappearance of the diphtheria bacilli. Dr. DeWitt's experiments show that the reason "for the apparently favorable action of Staphylococcus aureus on chronic diphtheria cases, seems to be, not an antagonism or incompatibility between the two organisms, but an effort to reinforce the favorable, friendly throat flora, in the cases in which they are unable to gain their natural, normal ascendancy."

"Diphtheria" of the Udder of a Cow

Drs. William Robertson and Rory E. McLaren, of the Health Department of Leith, Scotland, report in Public Health (London), January, 1912, a small outbreak of diphtheria suggestive of bovine origin. Nine cases occurred on the route of a milkman and investigation revealed an ulcer on the udder of one of the cows supplying the milk. Scrapings from this udder revealed the presence of organisms which exhibited all the cultural and microscopical characteristics of the Klebs-Loeffler bacillus. Virulence tests were not applied to this organism. There was no evidence of sore throat among the persons handling the milk and swabs taken from their throats were negative. No further cases developed when the milk from the affected cow was no longer used. The authors refer to the fact that Klein has demonstrated that cows inoculated with diphtheria bacilli show subsequent specific eruptions on the udder.

Water Disinfection

The following recommendation for purifying water in small quantities is made by the Health Department of Toronto for the use of campers, prospectors and travelers:

Chloride of lime one level teaspoonful rubbed in four fluid ounces of water and the mixture diluted with twelve ounces of water. Add of the above solution one teaspoonful to two gallons of water to be purified, mixing thoroughly. This mixture gives between four and five parts of free chlorine to a million parts of water, enough to destroy in ten minutes all the typhoid and dysentery producing germs, leaving the water without taste or odor.

Poisoning Epidemic in Berlin

"A mysterious epidemic of poisoning occurred among the inmates of a municipal shelter in Berlin, and having continued for about a week, ended on January 2nd, the number of cases being 171, with 78 deaths. The epidemic was suspected to be due to the consumption of cognac adulterated with methyl alcohol. The cognac supplied by certain public houses near the shelter was analyzed, and when these establishments were closed by the police the epidemic ceased. The wholesale dealer who had supplied the adulterated cognac was discovered, and in his cellars the police found large quantities of methyl alcohol, a portion of which he had sold as genuine ethyl alcohol. He was arrested and will be prosecuted for manslaughter." (Public Health, London, February, 1912.)

Measurement of Air Vitiation

MM. Henriet and Bonyssy, of Paris, have recently proposed to measure the vitiation of air by a direct determination of organic matter therein and which is presumably emanated from the bodies of men or animals. A cold vessel is used to condense the moisture from a known volume of air, after which the water of condensation is examined for oxygen consumed. Results are stated in milligrammes of oxygen required per 100 cubic meters of air. In a series of examinations with this method of the air in parks, workshops, and the like, the analytical results seem to correspond to the objectionableness of the condition encountered.

(Public Health, London, XXV, 5, February, 1912.)

Some English Ideas on Infant Mortality

In the Conference on the Hygiene of Childhood at the recent Congress of the Royal Sanitary Institute (Belfast, 1911) some interesting and suggestive views were expressed on the subject of infant mortality. Sir John Byers, president of the conference, emphasized the national importance of the problem, and drew attention to what he considered the leading influences in causing wastage of infant life. These he believed to be (1) general insanitary conditions and habits in the homes of the poor, and (2) maternal ignorance in the selection, preparation, and administration of food. With respect to Ireland he pointed out that while the infant death-rate for the country in general is low (95 per 1,000 births in 1910), it is still much higher in the urban districts (128) than in the rural ones (74). In Belfast the corresponding figure was 143, and in Dublin 142; as compared with 139 in Liverpool, 132 in Manchester, and 103 in Edinburgh and London.

Proposals to modify Section 61 of the Factory and Workshop Act of 1901 so as to forbid the employment of women until three months after child-birth instead of one month as at present were objected to by Dr. Alfred Greenwood, Medical Officer of Health of Blackburn. In an investigation bearing on this question at Blackburn the subsequent history of 500 births from five districts representing varying degrees of prosperity were thoroughly studied. Among 314 of the mothers industrially employed 13.5% of the infants died in the first year. Among the infants of the remaining 175 mothers not industrially employed the corresponding mortality was 12.2%. Arguing from the insignificance of this difference in the face of greater poverty among the industrially employed, and from the fact that an increasing number of mothers are coming to take the longer period voluntarily, Dr. Greenwood believed that to increase the legal period would be of doubtful advantage. On the other hand such a course might have disastrous results in cases of extreme poverty.

The satisfactory operation of the Notification of Births Act was the subject of a paper by Dr. W. G. Willoughby, Medical Officer of Health of Eastbourne. Upon receipt of a notification a visiting nurse is sent to confer with the mother, unless the doctor in charge advises to the contrary. The nurse makes such suggestions, in a tactful manner, as seem called for, revisits the case, and takes a permanent interest in its progress. In 1910 34% of all the births in the district were visited in this way, the remainder being among the well-to-do, institutional births, and those excepted by the medical men. The results seem to have been most satisfactory. In the visited cases, in spite of their being among the poorest people, the mortality was but 57 per 1,000 births, as compared with 93 for the whole district, and 109 for the cases too well-to-do to be visited. Among the illegitimate births the mortality in visited cases was but one-tenth as compared with one-quarter among the unvisited. Although the figures involved are somewhat small for a statistical basis (the population of Eastbourne being 53,000), these results are extremely suggestive, and should be encouraging to those who are working for similar measures in this country.

(Jour. Royal San. Inst., XXXII, 12, Jan., 1912.)

The Value and Efficiency of Fumigation

To fumigate or not to fumigate that is the question which is one of the most important for health officials to solve at the present time. There is much dissension as to the value of terminal disinfection after the vacation of premises which have been occupied by patients who have had the common infectious diseases. A strong argument against the practice has recently been made by Dr. Wm. W. Walcott, State Inspector of Health of Massachusetts.* Dr. Walcott made a series of experiments with formaldehyde which was generated in the following ways: Generator, permanganate of potash, aluminum sulphate, calcium chloride and certain proprietary forms of so-called "solid formaldehyde." The tests were made under conditions similar to those used after a case of disease, and "in the manner in which the average disinfector does his work." The test rooms were prepared in a proper manner by closing up all openings with adhesive paper strips with the exception of the key hole and cracks around the door, which were stuffed with absorbent cotton. The test organisms were B. diphtheriæ, Streptococci and Staphylococci which were obtained from diphtheria and scarlet fever patients. The method of obtaining the cultures was as follows: "Swabs were taken, and blood serum tubes, inoculated from the swabs, were incubated for twenty-four hours. At the end of that time, sterile cloths inoculated from the cultures were placed at different levels in the rooms or smears placed on the walls or floor, and exposed to the disinfectant for twenty-four hours. At the end of that time the rooms were opened and blood serum tubes inoculated from the test cultures.

"The inoculations were made by moistening sterile swabs in sterile water and rubbing them over the test cultures. The tubes were then incubated for twenty-four hours, at the end of which time slides were examined and the growths checked against those of the original cultures. If no growth was found at the end of twenty-four hours the incubation was continued for forty-eight hours, and, if necessary, for seventy-two hours. If no growth was found at the end of that time, the culture was considered sterile."

The following interesting statements are made as a result of the experiments:

"As regards the amount of disinfectant used, it seems evident that amounts of formalin ranging from 12 to 32 ounces to 1,057 cubic feet of air space have no consistent effect upon organisms exposed to its influence for twenty-four hours, and that the results are as varying when the two chief methods of releasing the gas are compared. The results obtained by using the permanganate method show slightly more negative findings, but in experiment No. 9, which shows the best results, the cultures were all old. When fresh cultures were used the results were no more consistent than by the other method.

"The proprietary preparations, when used in the amounts specified in the directions, for the contained air space, persistently and consistently refused to give results. In two instances, where double the advertised amounts were used, there was 50 per cent. of success, but in other instances the same failure resulted."

Dr. Walcott also collected data as to the methods of disinfection used in the towns and cities of his district as well as from a number of cities in the United States and concludes his interesting contribution as follows:

"Since the results of experiments in dealing with known quantities in a room of known size under actual service conditions lead us to doubt the value of fumigation as it is carried out today, it seems only fair, when we consider also how the work is done in the local communities, to conclude that fumigation as actually practiced is a waste of time and money, and, furthermore, that it gives to the public a false sense of security.

"While it is true that fumigation is the indirect means of causing a sick room to be thoroughly aired, it seems that even good ventilation of a room cannot justify the general practice of 'fumigating' suspected bedding and such articles of the infected as could, and should, be boiled.

"The laity also has such strong faith in the efficiency of the present methods of fumigation that scrubbing and subsequent cleansing of the room and its contents are considered by them unnecessary, and so frequently not done.

"It would seem best, therefore, to substitute for the present day 'fumigation' such precautions as thorough airing of the room, cleansing by scrubbing, and possibly renovating, and the destruction by fire of such articles as might act as media on infection —articles that cannot be properly cleansed or exposed to sunlight."

No reference is made with regard to the temperature or humidity conditions that existed at the times when the experiments were carried on.

*Annual Report, State Inspectors of Health of Massachusetts, 1910., pp. 108-120.

Influence of Heat on Infantile Mortality

"A recent issue of the Deutsche Vierteljahresschrift fur offentliche Gesundheitspflege vol. 43, parts 2 and 3) contains an interesting paper by H. Leifmann (Privatdozent der Hygiene) and Dr. Alfred Lindemann. In this paper the authors discuss very fully the causes of infantile mortality in relation to the heat of summer in Berlin and some other large towns such as New York and Munich. The paper deserves some special notice, since the authors have been at great pains to tabulate the daily mortality of infants for several years, together with a daily thermometric record taken at 2 p. m., with a maximal temperature. Reasons are given for preferring the 2 p. m. temperature in endeavoring to find a correlation between it and the mortality.

On looking over these one cannot help being struck with the remarkable parallelism of the two curves, and it is difficult to avoid the conclusion at which the authors arrive, that there must be some very close connection between heat and mortality. The two main views are represented by two schools, in one of which—represented by Meivert—a direct effect is attributed to heat, and in the other an indirect effect through the heat causing decomposition of food, and as a consequence infection through the alimentary canal. The authors incline to the former view, and state that the parallelism is most striking in the early summer, and they are led to the conclusion that the heat must constitute an immediate source of danger to infants, and that it does not require decomposition of milk by heat, or the spread of infection to increase the mortality among infants. Their reasons for this view are as follows:

1. In almost every year one finds a striking parallelism on hot days between the temperature and the infantile mortality in early summer.

2. Only temperatures of over 23° C. are connected with a distinct rise of the mortality.

3. Years of abnormal conditions of temperature show a like abnormal behavior of the mortality.

4. The mortality of breast-fed children is increased.

5. Infants which live in underground rooms and frequently, owing to the high temperature outside, receive milk decomposed during transport, do not show increased mortality.

6. The mortality rises often so quickly with the temperature that an immediate injury to the children must have taken place. If death occurs one or two days after the beginning of the heat, it must be considered that (a) the illness began at the time of the greatest heat; (b) that the injurious agent is the heat of the dwelling, which follows after and remains longer than the temperature of the outer air.

7. On hot days of the early summer the children do not die mainly of gastro-intestinal complaints. Convulsions come first. These symptoms are similar to those that one finds in adults on over-heating, viz., heat convulsions.

8. The mortality follows a falling temperature remarkably quickly. This cannot be explained either by infection or decomposition of food.

The conclusions are confirmed by clinical observations (detailed in the paper).

The recommendations for the prevention of the mortality deal with the (1) early summer and (2) the later summer, and question of (a) the removal of infants into cooler quarters, (b) the keeping of the dwelling cool, (c) quenching thirst, (d) clothing, etc., are all fully discussed. The paper is well worth studying by those interested in infantile mortality."

Public Health (London), January, 1912.

North Carolina and Tuberculosis

The Bulletin of the North Carolina State Board of Health for the current month gives up the greater portion of its space to the consideration of tuberculosis. The article includes about a dozen pages of text and a number of illustrations. It considers geographical distribution, some comparisons with diseases much less fatal but feared through being less familiar, and passes next to the consideration of the cause, the seed and the soil. The latter depends on the condition of the body and this can be controlled to an extent by outside influences. The article considers the importance of sunlight, of ventilation and of good food and the dangers of worry and alcohol. Another article in the Bulletin, by Dr. Hubert A. Royster, calls attention to the fact that the public health is made up of the sum of the health of the individuals. Health problems, therefore, are to be settled, not in the herd, but singly. "Some are born sick," writes Dr. Royster, "some achieve sickness and some have sickness thrust upon them," and the way to avoid it is by getting out of its reach or by throwing it off when it comes. With reference to education, this writer says, "In the last analysis we want to get hold of the average man, the most uninformed man, and tell him how to live right. Laws are good and we must have them, but there are some things that cannot be legislated into the people." An article on "Constipation" calls attention to the importance of the inconspicuous, another discusses the necessity of interesting the women in health matters, while an editorial notes that the county health officer is now the weak link in the chain. The Bulletin is worthy the attention of health officers and those interested in the splendid work that the South is doing with its modern health movements. It is under the care of Dr. W. S. Rankin, who not long ago made the tour of the Northern States seeking the best and most efficient methods.

Milk Preservatives

The following taken from the Medical Officer (London), February, 1912, should be of interest to the chemists of State and local Boards of Health who have to analyze milk and cream samples for preservatives:

"There is a great trade done in so-called milk preservatives, most of which contain formalin, boracic acid, salicylic acid, or similar substances, which are not difficult for an analyst to discover. According to a report to the Local Government Board (England and Wales) of Dr. G. W. Monier-Williams just issued, a method has been discovered of treating formaldehyde with sodium nitrite in such a manner that the detection of the former is not easy, unless the chemist is alive to the possibility of the presence of sodium nitrite.

"Dr. Monier-Williams states that a quart of milk treated with the preservative will contain two grains of sodium nitrite, which is the maximum pharmacopœal dose of that substance. He adds that sodium nitrite is a dangerous drug, with a powerful action on the heart, and should not be taken except under medical supervision. Apart from the possibly injurious action of the formaldehyde, it is clear that the consumption of milk containing the maximum medicinal dose of sodium nitrite in one quart is fraught with considerable danger to health, which would be accentuated in the case of children or invalids."

Rain-Water and Milk

A novel defence was recently brought in by a milkman in Wigton, England, who was charged with having added over 10 per cent. water to the milk he sold. He stated that it was due to the fact that he left the milk can outside all night and that there had been a heavy rain which accounted for the added water. It was demonstrated in court that at least 12 inches of rain would have had to fall during the night in order to have caused the amount of water in question to have entered the can. This would represent one-third of the annual rainfall of Wigton. The milkman was fined $20.

Pellagra

Pellagra has been the subject of a recent epidemiological study in the vicinities of Spartanburg, Chester and Rockhill, South Carolina, under the direction of R. M. Grimm, Assistant Surgeon, Public Health and Marine Hospital Service.* Data was collected in 380 cases, and 83 cases were personally visited to collect data bearing on the disease.

In this preliminary report, facts and observations relating to the epidemiology of the disease have been recorded, with no further attempt at discussion and analysis of the same, and the main points are as follows:

The towns investigated are located more than 500 feet above sea level and are usually well looked after by the mill operators. The majority of cases personally visited were cotton mill workers, poor, overworked and underfed. Their homes showed signs of poverty and neglect, specimens of the ordinary bed-bug being taken from several. The majority of the houses of the pellagrins were unscreened, and mosquitoes were prevalent. Packed meats and canned goods form a large proportion of the daily diet, bought both at the mill and other local stores. All of the pellagrins seen by Dr. Grimm (83 cases) gave a history of having eaten corn products more or less regularly as an article of diet.

The study of a small cotton-mill village in Chester County was of particular interest. This village, with a population of about 500, has had 25 known cases of pellagra develop in it.

The comments and discussion of the cases, which will doubtless be published later on, will be waited with interest combined with the hope that something may be discovered which will lead to an understanding of the causation of this obscure disease.

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* Public Health Reports. Vol. XXVII, No. 8.

VOL. II. MARCH, 1912 No. 3

AMERICAN JOURNAL OF PUBLIC HEALTH

STUDIES IN AIR AND CONTACT INFECTION AT THE PROVIDENCE CITY HOSPITAL

CHARLES V. CHAPIN,
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The French were the first to suspect that air is of minor importance in the transmission of contagious disease and to modify hospital management accordingly. The most notable instance of the application of these views is at the Pasteur Hospital in Paris, which was opened in 1900. The management of this hospital assumes that air infection is of no importance in a cleanly hospital and that contact infection can be prevented by proper technique. The methods of the French have been imitated in a number of hospitals in England, and to a less extent in Germany, but have attracted little attention in the United States. Even to-day there are probably few who would not be shocked at the proposition of caring for cases of diphtheria, scarlet fever and measles in the same room and by the same attendants.

Without knowledge of what was being accomplished in France, the writer had long been convinced by other clinical facts, and also by the results of laboratory research, that the relative importance popularly attributed to air and contact infection should be reversed. A visit to Las Animas Hospital in this city, where Dr. Guiteras was boldly and successfully applying the new-found knowledge in regard to yellow fever, and where cases of that disease and of typhoid fever were treated in the same ward, confirmed the belief that a more definite knowledge of how other diseases are spread would lead to simpler and better methods of control. Later on, inspection of European hospitals where the new methods are practiced, convinced me that air infection in such hospitals is a negligible factor. Both the French and the English seem to have limited themselves merely to perfecting hospital management and have not cared to generalize from their experience. But the facts which have accumulated as a result of their work, taken together with the mass of evidence from other sources, justifies no other working hypothesis than this, that contact infection is by all odds the chief factor in the spread of the common contagious diseases. At all events when the hospital for these diseases was opened in Providence, it was frankly held by all concerned in its management that this was the only safe principle to guide our practice.

Read before the Municipal Health Officers' Section, American Public Health Association, Havana, Cuba, 1911.

There is nothing unusual about the construction of the hospital except perhaps that no effort is made to secure air isolation, if the term may be permitted, and every facility is afforded for the attendants to wash their hands. There are three two-story wards accommodating easily in all 150 patients. One building has been used exclusively for scarlet fever and complicating diseases. In another building the lower floor has been used for diphtheria and the upper floor for tuberculosis. The third and smaller ward, called the isolation ward, has 12 separate rooms on the lower floor opening into a common corridor, which it was hoped would accommodate most of the mixed and doubtful cases which are the chief problem of hospital management. The upper floor has larger rooms for groups of such cases. The other buildings also have an unusual number of rooms for one, two, three, or four patients. The purpose of this subdivision is by no means to secure air separation, and as a matter of fact the doors are all constantly open, but to provide for a separation of patients of different ages, sex, color, race and degree of illness. A large number of children, if it is determined with a fair degree of certainty that they all have the same disease, and particularly if they are convalescent, may be treated safely and more economically in a large ward. But adults, very sick patients, doubtful cases, and most cases are doubtful until some days after admission, and mixed cases, are better cared for in smaller rooms, though not necessarily always in single rooms. So far as air infection is concerned a case of mixed scarlet fever and diphtheria can be cared for perfectly well in a large ward full of scarlet fever patients, but it is difficult to prevent contact infection with other cases, and a busy nurse does not so readily remember that she must take unusual precautions with the mixed case, though she may be more or less successfully reminded of this by a red card, or a screen about the bed, or some other "barrier" as it is called, as is often done in English hospitals and not rarely in the Providence Hospital. But it is easier to guard against contact infection if such case of mixed infection is placed in a separate room, even if the door is left wide open.

One special feature which is considered of great importance is a lavatory for each of the rooms except the four large wards. The hot and cold water faucets of each are operated by eight inch levers moved by the elbow. There is no plug so that only running water can be used. Unless it is made easy to wash the hands they will not be washed. For other details of construction or furnishing reference may be had to the first report of the hospital, or to papers by the superintendent, Dr. Dennett L. Richardson.

In the large wards where all the patients are assumed to have the same disease and where they are mostly convalescent and out of bed playing with one another, the attendants make no special effort to avoid carrying infection from one to another, but the key-note of the management of all other cases is that the attendants shall by strict medical asepsis avoid self-infection and the transference of infection from one patient to another. I will be pardoned, I trust, if I now quote largely from a paper read by Dr. Richardson at the last meeting of the Association of Hospital Superintendents:

"The resident physicians have their quarters in the administration building and all eat in the same dining-room. While working in the wards, white duck suits are worn, and in each ward a gown is put on if it is necessary to examine patients, thus coming in direct contact with the bedding and patient. On leaving the ward, the gown is removed in the gown and wash room, and the hands are carefully washed with soap and water in the special basin to which I have already referred. Great care is exercised when not having a gown on to avoid allowing any part of his clothing to touch the bed, bedding, or anything else.

"The nurses all sleep in the same home and eat in the same dining-room. When off duty, they are allowed to leave the hospital as freely as from any general hospital. When the nurse goes on duty, she goes to the dressing room for that ward where she has two metal lockers, one for clean clothes and one for infected clothing. She puts on her ward clothes and goes to the ward. She changes her dress, cap, apron, and bib only. When going off duty, she removes her infected clothing first, washes hands and face, and then puts on her uninfected uniform.

"The maids and other help put on gowns when entering the wards. These gowns have short sleeves so that the sleeves will not be contaminated. Otherwise they observe the same care as do the nurses. The ward help eat in the same dining-room and sleep in the same home as do all the other help, and they, too, are free to come and go when off duty. It is insisted that every case of illness among nurses and help be reported at once that no mild infection may be overlooked.

"The same kitchen furnishes food to patients and employees. Food supplies are sent to ward kitchens in paper bags and paper trays and these are destroyed. Such dishes as must pass between kitchens are boiled before leaving the ward and are washed again in the main kitchen."

The methods of handling the cases in the hospital, and the means taken to avoid contact infection can best be illustrated by the following description of the technique employed in our isolation ward, though substantially the same procedures are carried out when two or more cases of different diseases are treated in the same room, in other parts of the hospital. The isolation ward, it will be remembered, has single rooms only on the first floor, and rooms that vary in size on the second floor.

"We confine the infection to the rooms immediately occupied by patients. We expect that the corridors, serving kitchen, linen room, bath and toilet rooms are as safe and free from contagion as those of any general hospital. The same nurses care for the patients on a single floor. The nurse washes her hands with bar soap in the running water and dries them on an individual towel every time she touches the patient or anything in the room. If she comes in close contact with the patient she puts on a gown. Each patient is supplied with thermometer, urinal, basins, ice bag, heater, and so forth, everything necessary for constant use on the patient. All dishes and nursing apparatus coming from these patients are put directly into a sterilizer in the diet kitchen, if steam can be used, or 1-20 carbolic for rubber and glass goods. Bed pans and urinals are emptied into the hopper in the lavatory and are put into a tub of 1-20 carbolic where they are kept for an hour before removal to the warming rack.

"Small children who would play on the floor are kept in bed throughout their hospital residence. Larger children or adults are allowed up but confined to their rooms except when allowed out of doors, where they are also kept apart. The doors of the rooms stand open all the time, and this practice, together with the extra corridor window, allows patients to see each other and to talk back and forth, and they seem to be very contented.

"When a patient is discharged, the linen in his room is sent to the laundry, the mattress and pillows to the steam sterilizer, and nursing articles are sterilized. The bed, wash basin, table, chair, floor, and walls within easy reach are simply washed with soap and water. Preferably the room is aired for twenty-four hours, but if we need it we have not hesitated to put a new patient into it immediately. Fumigation is never done.

"You will have noticed that we do not use any disinfectant solution for the hands. It has seemed to us that if we could make it convenient enough so that every time hands became infected they would be washed with soap and water, it would be sufficient. There is no antiseptic solution which is efficient under immersion if less than one minute. It is impracticable and impossible to get so long an immersion after washing, done by busy nurses, what is more important all the solutions injure the hands, setting up a dermatitis, which is a good soil for infection to linger upon. The results which I shall directly present,, seem to substantiate this practice.

Except during the first few weeks after the hospital was opened no prophylactic antitoxin has been administered to nurses, help, or to patients. Among the 128 nurses, graduates and pupils who have worked and are working in the wards, to September 1, 1911, the following diseases have developed:

Diphtheria, 3 cases.
Scarlet fever, 3 cases.
Rubella, 2 cases.
Mumps, 1 case.

One physician had diphtheria and a maid had scarlet fever, making a total of 12 among all attendants. 1,107 patients have been admitted to the hospital up to September first.

The following diseases have developed among patients in all wards save the isolation wards:

(1) One case of diphtheria in the scarlet fever ward.

(2) Five cases of measles in the scarlet fever ward, from some unknown sources.

(3) One case of rubella.

Since June 4, 1910, no further cross infections have developed among patients admitted and discharged from the diphtheria and scarlet fever wards, except the following: "A child with scarlet fever had been kept in the diphtheria ward for about a month without any extension of the disease, but finally a little diphtheria patient made its way into the room where the scarlet fever case was and came in contact with it and, as a result, developed scarlet fever. So, too, the case of the ward maid referred to above, was probably due to contact infection, as she was known to have eaten fruit which belonged to, and had been handled by a scarlet fever patient. The fact that these cases were almost certainly due to contact infection, suggests the probability that the other cross infections were also caused in the same way, though the exact means was not determined.

"I want to call your attention particularly to the results in the isolation ward, where we have not hesitated to place any disease in any stage, or cases for observation only. 345 patients have been admitted and discharged. Many of these patients were suffering from more than one disease, so that the number of sources of infection was as follows:

	1911	1910	Total
Scarlet Fever	69	38	107
Diphtheria	29	18	47
Measles	18	38	56
Whooping Cough	25	29	54
Rubella	14	2	16
Chicken Pox	8	6	14
Mumps	4	5	9
Gonorrheal Vaginitis	..	7	7
Variola	1	..	1
Erysipelas	..	1	1
Acute Tuberculosis	1	..	1
Positive Diphtheia Cultures	31	21	52
Sources of Infection	200	165	365
Non-contagious Cases	23	25	48
Total	223	190	413

Of these 345 patients, 296 were in the wards more than one week and 49 less than one week.

The following diseases have been transmitted: One case of measles and one case of chicken pox. Following these for nine months, nothing developed. Within one week, in the latter part of January, 1911, four cases of scarlet fever developed and a fifth about three weeks later. Of these five cases the diagnosis of only two was definite. They were mild cases. The other three showed very little or no constitutional disturbance; one did not desquamate at all, and the other two desquamated a very little. We have, however, classed them all as scarlet fever. There has been no cross infection since February 23, 1911.

I want to add that during the larger part of the period reported on, much of the work has been done by pupil nurses who were sent to the isolation training for about two weeks only. We are planning, however, to have most of it done by a permanent staff.

It might be of interest to note that we have treated advanced cases of tuberculosis in the second story of the diphtheria building for 19 months and there has never been a case of diphtheria among them. The tuberculosis ward holds about 35 patients and there have been admitted in all 204."

Nurses and physicians have acquired infection as they have in similar institutions. The opportunities for infection are, however, greater in the Providence hospital than in most hospitals for individual attendants are not confined to the care of one disease. That some of our infection of attendants has been due to failure to take precautions against contact is certain. That most of it is due to spray infection while bending over the patient is highly probable. It is difficult to see how such infection can be entirely avoided without a constant wearing of masks.

Cross infection from patient to patient has also occurred, rather less, however, than in most institutions of the kind, although a greater variety of diseases are admitted than is usual. As no effort is made to secure "air isolation," our experience indicates that infection by means of the air, outside of droplet infection, rarely if ever occurs where conditions of cleanliness prevail.

As nurses constantly pass freely from one disease to another, the theoretical opportunity for cross infection by contact is very great. The fact that such infection has rarely occurred shows that the means taken to prevent it are very effectual. The particular point of interest is that unnecessary frills, like caps, gowns under certain conditions, rubber shoes, gloves, disinfectants and fumigation, are omitted, and that emphais is laid on simple cleanliness. That cross infection has occurred seems most likely due to failure in technique, not to faulty principles of management. With pupil nurses such failures can hardly be entirely avoided. The wonderful success of the Pasteur Hospital I believe to be largely due to the employment of a permanent staff. Under the conditions of nursing which prevail in American hospitals and with the great variety of cases which the Providence hospital has been called upon to treat, great credit is due the superintendent and the head nurse for the excellent results attained.

Discussion.

DR. GUITERAS:

At Las Animas Hospital in Havana we have proof in support of the position taken by Dr. Chapin. We have separate rooms in the same building where at times scarlet fever, measles, diphtheria and varicella are treated. Doors and windows are always open. But we are very strict as to the change of gowns and constant washing of the hands. The nurse goes to the patient with the hands wet in bichloride solution, or, more frequently, well soaped. There is always a basin with bichloride solution in every room, and the soaped hands are immersed in bichloride on leaving, and then washed with soap outside the room. I think there are two advantages in approaching the patient with hands already soaped: the mind is kept on the wet hands, and subsequent washing is not forgotten; it is probable also that the infecting material is thus more readily washed off. We have no infections in the hospital. Our imported cases of smallpox we handle in the same way. In the case of smallpox the bed stands on sheets wet with bichloride solution. The nurses use slippers that are left at the door together with the gown. We commence very early the bathing of the patient with bichloride solution 1 to 4,000.

We quite frequently import severe cases of variola from Europe and Mexico, and there are no secondary cases. Everybody in the hospital is vaccinated whenever a case is admitted.

We are equally successful in the management of typhoid. Our wards are screened against mosquitos, and flies are, therefore, quite rare.

RECENT CONTRIBUTIONS TO OUR KNOWLEDGE CONCERNING INFANTILE PARALYSIS

Mark W. Richardson, M.D.,
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It is not the purpose of this paper to give a detailed account of the disease known as infantile paralysis or anterior polio-myelitis. Its scope will be restricted rather to a short discussion of the more important contributions which have been made to our knowledge of the disease during the past year. These contributions have not been, to be sure, of an epoch-making character, but they indicate distinct progress and emphasize certain lines of investigation as worthy of further attention.

Perhaps the most unusual finding was that of Henstaedter and Thro, who were able to produce what they considered typical polio-myelitis in monkeys by inoculation of these animals with emulsions of dust taken from the rooms of patients sick with the human disease. They were able, furthermore, apparently to transfer this experimental polio-myelitis to a second series of monkeys. Henstaedter and Thro believe, therefore, that infantile paralysis is propagated by dust and that the nasopharynx is the point of entry for the virus.

On the other hand, Rosenau, Shepard and Amosso and also Strauss have not been able to demonstrate any infectious power in the secretions of mouth and nose taken from polio-myelitis patients, even though the virus has been shown by Flexner, and also by Osgood and Lucas to persist for several months at least in the nasal mucous membranes of human beings and monkeys. The final estimation as to the value of Henstaedter and Thro's dust experiments must await confirmatory investigation.

The possible rôle of animals in the spread of infantile paralysis has always been of interest, for paralysis in animals and fowls of various species, such as the horse, cow, sheep, pig, dog, cat, hen, duck, etc., has been seen many times, occasionally in intimate association with human cases of paralysis. Proof continues to be lacking, however, that there is any etiological connection between the human and animal affections. Prof. Theobald Smith has inoculated monkeys intracerebrally with filtered emulsions of 12 such animal spinal cords, in every instance with negative results. A similar filtered emulsion from a human case proved positive.

Recent work of Flexner has shown that unfiltered material is much more dependable in these experiments, and it is possible that further inoculations with unfiltered emulsions of animal cords may give more positive information.

In this connection an interesting report is that of Römer, who has observed a spontaneous paralysis in guinea pigs, due to a virus which is filterable and in many ways resembles the virus of human anterior poliomyelitis.

That human anterior poliomyelitis can be transmitted to rabbits has been maintained for some time by Krauss and Meinicke, but most other observers have doubted this statement. In relation to this disputed point the results of Marks at the Rockefeller Institute are of especial interest.

Read before the American Public Health Association, Havana, Cuba, December, 1911.

Marks found that rabbits inoculated in the usual manner with polio-myelitis material became sick and died, and that the fatal affection could be transferred from rabbit to rabbit. The disease in rabbits, however, did not resemble human infantile paralysis either clinically or pathologically, but Marks was able to show that when the rabbit virus was reintroduced into monkeys it once more produced a typical paralysis.

The suggestion is, of course, that animals may be the unsuspected hosts of powerful viruses which unfold their paralytic characters only when introduced into human beings.

In this connection it is of interest to note that Massachusetts statistics for each of four consecutive years have shown that infantile paralysis is approximately 10 times as prevalent in the country as in the city. As would be expected, furthermore, country children have been shown by figures to be many times more subject to contact with animals of various kinds than city children.

The presence of animals means, necessarily, the presence of a host of biting flies and other insects, and an investigation by the State Board of Health of Massachusetts during the past summer showed in every one of 88 cases of infantile paralysis the presence near the house, on the house, within the house, and sometimes even in the sick room itself, of the ordinary biting stable fly, *stomoxys calcitrans*. This fly is, I understand, closely related to the tse-tse fly, already proved to be the carrier of disease. Whether stomoxys calcitrans can carry the infection of anterior polio-myelitis either directly or through some intermediate form developed within its body remains to be proved. Experiments looking towards that result are now in progress.

In harmony with such a theory of transfer would be the fact that anterior polio-myelitis has seemed to have an affinity for railroads and high roads. Many animals, healthy and diseased, together with their biting parasites, are passing constantly over the railroads, and high roads. Two patients in Massachusetts were young trainmen. Infective flies might, furthermore, follow horses or other animals, or even human beings, for long distances and cause secondary infection far from the original focus. In this way might be explained many apparently sporadic cases or even cases transferred apparently through the mediation of third persons. The true incidence of the disease coincides, moreover, with that for the greatest prevalence of insect life.

Hard to reconcile with such a theory, however, are the winter cases. Cannot their cases be explained by the assumption of a prolonged incubation period? Anterior polio-myelitis has many points of resemblance to rabies. May it not, like rabies, in certain instances, have an incubation period lasting weeks, or even months?

While it is true that an attack of polio-myelitis confers a large degree of immunity, it seems to be equally true that second attacks do occur. Thus such cases have been observed in Massachusetts, the interval varying from one to 16 years. In the period between attacks is it not possible that the affected individual becomes a carrier of the specific virus?

In one case we have noted the occurrence in the same individual of anterior polio-myelitis and herpes zoster. Have not these two affections the same pathological basis?

Strauss in a description of the pathology of anterior polio-myelitis states "the posterior root fibres and the arachnoid membrane covering the spinal ganglia are likewise infiltrated. This infiltration and that of the pia, together with the inflammation which is present in the spinal ganglia themselves are the factors which cause the irritative symptoms such as hyperæsthesia of various portions of the body, rigidity of the neck, the pain caused by movement of the joints, all of which are present in the early stages of the disease in its epidemic form." Strauss does not, however, mention herpes zoster as a possible complication of polio-myelitis.

It seems from the literature, however, that herpes zoster has for many years been classed with the eruptive fevers. It has seemed to be followd by a definite immunity. It has been known to occur in epidemics and these epidemics have favored the spring and summer months. It has seemed at times to be contagious, and it has been followed by paralysis of various muscles. The inference is strong that herpes zoster is due to the same virus as anterior polio-myelitis, but that it represents a different localization of the specific organism.

In one small, sharply localized focus in Massachusetts a case of zoster occurred in the summer of 1905. The polio-myelitis epidemic occurred in 1909. We know that anterior polio-myelitis occurs under many often atypical forms. It would certainly seem very possible that in herpes zoster we are dealing with one of these unusual types.

In an effort to institute specific treatment for anterior polio-myelitis Netter inoculated subdurally 4 patients with serum from recovered human cases. The donors of the serum used numbered 10 and had been sick anywhere from 2 months to 11 years previously. The amount inoculated was generally 7 c.c., with a maximum of 15 c.c. One patient received 9 inoculations, amounting to 103 c.c.

Four patients were treated in all. One died. Netter thinks the other 3 were improved by treatment.

It is thus painfully evident that we are still very ignorant concerning anterior polio-myelitis.

It is pleasing to reflect, however, that investigators of the first class are studying this disease all over the world, and that the quality of the work is such that the key to the problem may be discovered almost at any moment.

Discussion.

DR. SLEMONS:

In this discussion I would like to report a small epidemic which occurred in our city during the summer months. We had 9 cases, each occurring in large families. As the diagnoses in these cases were delayed and absolutely no attempt made at isolation, the exposures were necessarily very complete. In each family there were three or more separate exposures, and in no instance was there any evidence of secondary cases from the original 9 primary infections.

These cases occurred within a very short time, and it is our belief that they were in no way connected with each other. It was absolutely impossible to trace these cases to any source of possible infection.

DR. DOWLING:

Through investigation in North Louisiana we found nine cases occurred in one neighborhood and others in the same parish removed fifteen miles. Two weeks later four cases developed in Shreveport, one hundred miles west, and a few days after this the disease appeared in Natchitoches, ninety miles south of Shreveport, from which place a loving mother with two sweet children fled to escape the ravages of this dreaded disease. Before she reached the border line, a little more than one hundred miles, both of the children showed positive evidences of the infection and both were paralyzed. These were chiefly sporadic cases, and there is but little doubt that the same conditions existed at different points to cause the disease.

While returning from California last summer I read in a Chicago paper of the anti-fly campaign in Kansas and was surprised and gratified to learn from this article that the infantile paralysis had disappeared in communities where the flies had been exterminated.

DR. ROBERTS:

In reference to the remarks of Dr. Richardson concerning the greater prevalence of the disease in rural districts than in cities, I might say that our outbreak in Hamilton, probably the first serious one in Canada, and comprising some one hundred cases, seemed to originate in three or four cases early in July or the latter part of June. Then we had a sudden outburst of some forty or fifty cases during the end of July and first two weeks of August, with a gradual decline until the month of November. The disease in our section certainly appeared to spread from city to country, as it was some considerable time definitely existant in the city before reports and inquiries began to come to me from the country and smaller towns, one or two some sixty miles away, about the strange new epidemic. Information that came to me from Ottawa and Guelph would seem to indicate the same.

In the early cases there were a couple of instances where the disease was traceable to contact with children in houses where the disease was—the well children coming down in a couple of weeks after being with the affected.

DR. GUITERAS:

The greater prevalence of the disease among the whites over the negro population, I think, would argue against the transmission by biting flies about the stables.

DR. RICHARDSON:

I hope I did not give the impression that I considered this theory to be absolutely proved. As to why the disease affects rural localities more than cities, we have no idea. It seems to be a fact, however, that in rural communities, the disease is approximately ten times as frequent as in the larger cities.

SANITARY INSPECTION OF THE CANAL ZONE

A. J. Orenstein, M.D.,
Assistant Chief Sanitary Inspector, Canal Zone.

The sanitary work of the Canal Zone, with the exception of the one settlement of Cristobal, is under the immediate jurisdiction of the Chief Sanitary Inspector.

This area comprises the following settlements:

		Inspectors.
1.	Balboa	1
2.	Ancon	1
3.	Corozal	1
4.	Miraflores	2
5.	Pedro Miguel	2
6.	Paraiso	1
7.	Culebra	2
8.	Empire	2
9.	Las Cascadas	1
10.	Bas Obispo	1
11.	Matachin	1
12.	Gorgona	1
13.	San Pablo	1
14.	Tabernilla	
15.	Mitchelville	1
16.	Gatun	4
17.	Porto Bello	1

In addition there are a number of native settlements adjacent to the settlements above enumerated. The total area over which the sanitary work is carried out approximates one hundred square miles.

For the purposes of sanitation each of the above-named settlements, with the adjacent native villages, is designated a Sanitary District, and is under the immediate charge of a District Sanitary Inspector, who has as many Assistant Inspectors as may be needed for the work of the District. There are seventeen Sanitary Districts in the Canal Zone. The Canal Zone is further divided into two halves, each half being designated a Sanitary Division, and placed under the supervision of a Division Inspector.

The personnel of the Division of Zone Sanitation is as follows:

1 Chief Sanitary Inspector.
1 Assistant Chief Sanitary Inspector.
2 Division Inspectors.
26 Inspectors.
1 Inspector-Entomologist.
18 Foremen and 226 Laborers.

The authority of the Chief Sanitary Inspector and his deputies is derived from the following provision of the Canal Zone laws:

Read before the American Public Health Association, Havana, Cuba, December, 1911.

Act. No. 8, Sect. 20. "The Chief Sanitary Inspector shall have direct charge, management and control of all work performed or entered upon within the Canal Zone for the prevention or suppression of diseases. He shall be charged with the duty of securing the enforcement of all sanitary regulations, and perform such other duties appertaining to his position as may be required of him by the Chief Sanitary Officer, the Governor of the Canal Zone, or the Isthmian Canal Commission."

In order that this work may be effectively and efficiently accomplished, authority to enter upon any premises is given by law to the Chief Sanitary Inspector and his deputies.

For the guidance of the Sanitary Inspectors, a book of instructions has been compiled. This book sets forth briefly the essential things necessary to the Sanitary Inspectors for the efficient performance of their work, such as methods of inspection, methods of making out the routine and special reports, building and screening regulations, construction of pit and pail closets, night soil disposal, fumigation, disinfection, etc. In addition, the Inspectors are required to be familiar with the appearance, life history and habits of anophelines, stegomyia and culicines. They are expected to be able to distinguish these species in their larval and adult forms, and to be familiar with the methods of mosquito eradication in use here. Inspectors are also expected to be familiar with the breeding habits of the house fly and the usual methods of extermination of flies.

From time to time suitable literature is supplied the Inspectors and bulletins embodying approved methods of procedure are issued.

What promises to be a very important factor in increasing the general efficiency and esprit-de-corps of the Inspectors are the recently inaugurated monthly conferences of Sanitary Inspectors, which all Inspectors are required to attend. At these conferences the theory and technical details of sanitary work are considered and improvements in technique suggested and discussed by the Inspectors, under the leadership of the Chief Sanitary Inspector, his Assistant, or an invited specialist.

I cannot leave the subject of personnel of the Division of Zone Sanitation without paying the Inspectors this tribute: Without the slightest fear of being accused of overdrawing the facts, I can say that a more enthusiastic, hard working, efficient and loyal body of men has seldom been organized into a sanitary corps.

WORK OF THE DIVISION OF CANAL ZONE SANITATION.

The work done by the Division of Canal Zone Sanitation may be classified in the order of its relative importance and magnitude into:

(a) Anti-malaria work.
(b) Anti-yellow fever work.
(c) Anti-plague work.
(d) Anti-typhoid and dysentery work.
(e) General sanitary work.

The work directed towards the control of malaria is relatively of most importance from the standpoint of the Sanitary Inspector, because it claims by far the largest portion of his time and effort—approximately two-thirds of the Sanitary Inspector's time being devoted to this work.

The anti-malarial work done by the Division of Canal Zone Sanitation may be classified thus:

A. Elimination of breeding places of the Anophelines.
    (1) By filling.
    (2) By drainage—sub-soil, surface.
    (3) By admitting sea water into fresh water areas.
    (4) By cleaning and training the banks of streams and of stagnant bodies of water.
    (5) By brush-clearing and grass-cutting.
    (6) By introducing fish into reservoirs, streams, lakes and other bodies of water where oiling and treating with "larvacide" would be impracticable.
    (7) By oiling, either by hand or by means of automatic drip devices.
    (8) By periodical application of larvacide.
    (The last three methods serve also to destroy whatever larvæ happen to be in the areas treated.)

B. Destruction of larvæ.
    (1) Oiling with crude oil.
    (2) Application of larvacide.
    (3) Introduction of fish.

C. Destruction of Adult Anophelines.
    (1) Catching and killing with the aid of a tube containing a cotton wad saturated with chloroform, or by means of the ordinary wire gauze slapper.
    (2) Catching in traps.
    (3) Fumigation.

ELIMINATION OF BREEDING PLACES.

This work is under the direct supervision of the Chief Sanitary Inspector, who personally decides on the best method to be adopted in each case. A great many factors bear upon this question, and the subject is so large and would require such detailed treatment, that a discussion of it, to be of any practical value, is entirely beyond the scope of this paper. I wish to say, however, that an experience of seven years has taught us the great wastefulness in cost and effort of the open-earth ditch under tropical conditions. We regard all open, unlined ditches as expensive and unsatisfactory makeshifts, to be tolerated only when the work is of a very temporary nature or as preliminary to the installation of sub-soil drainage or of properly lined ditches.

CLEARING AND TRAINING OF BANKS.

Pockets in the banks of streams and vegetation in the water near the banks are most favorable breeding places. We endeavor, therefore, to keep the banks free from pockets and to keep the streams and banks well above high water, free from all vegetation. The banks are trimmed and lined with stone wherever necessary and pockets are filled or cut away. Algæ are destroyed with copper sulphate or larvacide, or raked out, and vegetation cut and raked onto high ground, where it is burned whenever possible.

INTRODUCTION OF FISH.

This has been done in the Canal Zone with a considerable measure of success, in the streams and reservoirs from which our water supplies are derived.

The fish known as "Millions" in Barbadoes, a very small top-minnow of the species Girardinus, has been used for this purpose. Under the climatic conditions of the Zone, these fish multiply very rapidly and are productive of a great deal of good in destroying mosquito larvæ. Of course, streams stocked with these minnows cannot be treated with larvacide or copper sulphate. It must be remembered that the introduction of fish is not nearly as efficient as the use of larvacide, and is to be recommended only for bodies of water where the use of larvacide is impossible. In order that the fish may have ready access to the mosquito larvæ, it is necessary to keep the banks as free of vegetation as possible and periodically to rake out the debris from the water, and train the banks so as to avoid having small collections of water separated from the main body.

OILING.

We make use of the crude oil of the Pacific Coast, a rather heavy asphaltum-base oil. The method of application varies with the nature of the area treated.

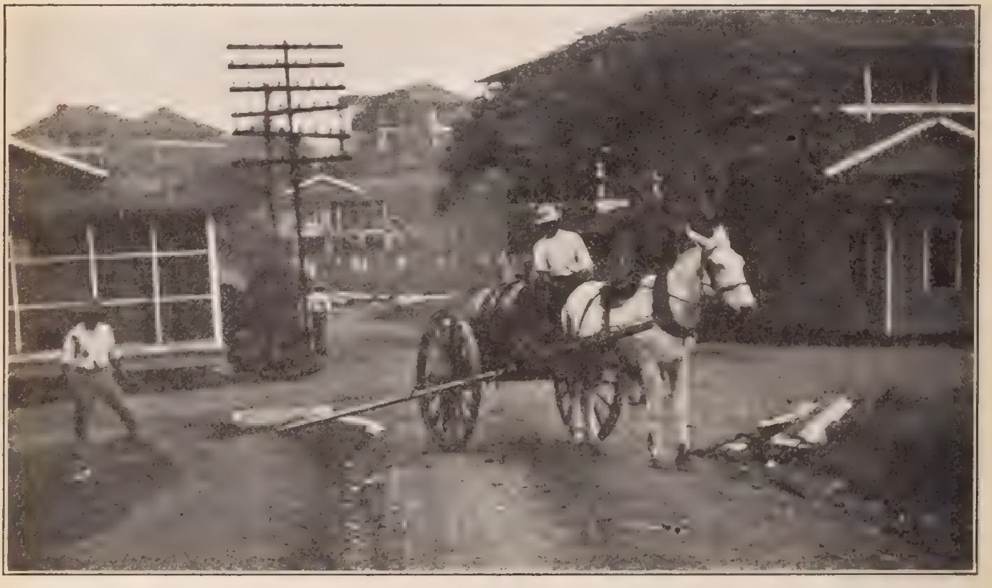


FIGURE I. OILING APPARATUS DEVISED BY INSPECTOR H. R. TRASK.
The pipe can be raised and lowered by means of a pedal.
Three rows of ⅛-inch holes are drilled in the outer thirty inches of the pipe.
The flow of oil is regulated by a hand valve placed near the driver's seat.

In streams of a moderate rate of flow, such as natural streams and earth ditches of a low velocity, the oil is usually applied by means of some automatic drip device. A number of such devices are now in use in the Zone, and each has its advocates, its advantages and disadvantages, the simplest and most efficient being the ordinary commercial galvanized iron ash can of about thirty gallons capacity, into the side of which, about three inches from the bottom, an opening about two inches wide and ⅜ of an inch in height is made. Into this opening is soldered a flat spout 1¾ inches wide, ¼ inch high, 2½ inches long, into which is inserted an ordinary wick. Three or four lengths of the wick commonly used in alcohol lamps, laid side by side, are very satisfactory. The rate of flow is regulated by compressing the spout until the oil drips with sufficient rapidity to give a good oil film.

The heavy oil used by us has a tendency to clog the wick. The clogging is, to a certain extent, prevented by putting into the bottom of the can sufficient water to reach within an inch or so of the wick. This water acts as a settling basin for impurities heavier than the oil. In addition, it is often necessary to "cut" the oil by the addition of from five to ten per cent. of the larvacide.

In order to be efficient, the drip-can must be placed two or three feet above the surface of the water to which the drip is to be applied, so that the drops may strike the surface of the water with sufficient force to be broken up.

The drip-cans described above, as well as the several other devices for the automatic application of oil, require constant watching to insure satisfactory action. It is our custom to inspect each can twice a week. One laborer in each district is usually assigned to the duty of adjusting and refilling these cans, and the Sanitary Inspector is expected to inspect them at least once a week.

In addition to automatic drip oiling, the streams on which drip cans are installed are treated with "larvacide" along the banks, whenever larvæ are found.

Bodies of stagnant water are oiled by the periodical application of a rather thick layer of oil, such oiling being repeated whenever the layer of oil is broken by rains, floods, action of the wind, etc.

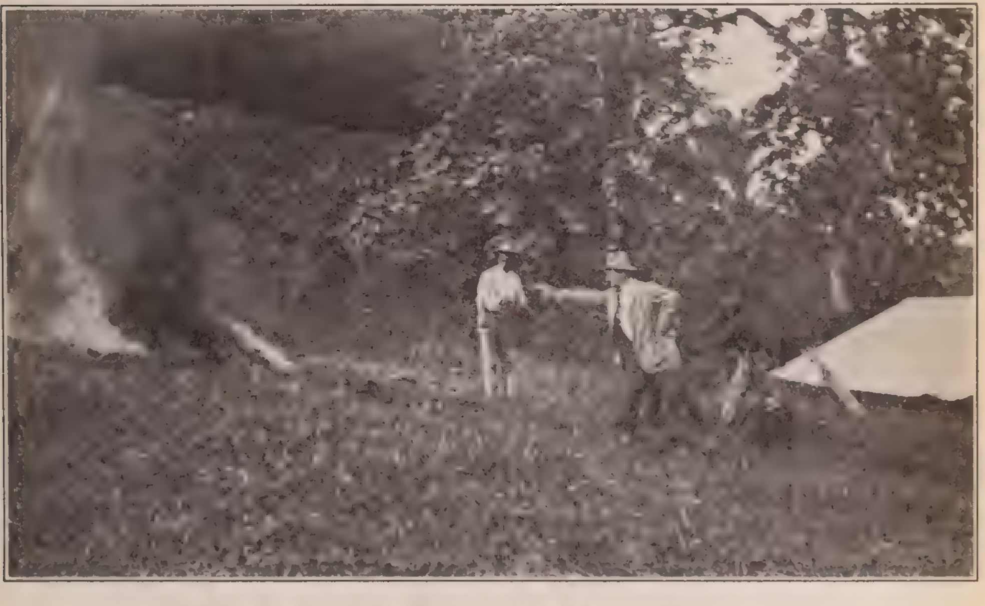


FIGURE 2. METHOD OF BURNING GRASS ALONG DITCHES.

The photograph shows the barrel, the pump and the operator starting the burning of a ditch. Note that the burning is started at the windward end of the ditch.

Whenever the prevailing winds are of considerable velocity and blow fairly steadily from approximately the same point of the compass, the oil layer on pools of considerable size shifts to leeward, exposing a more or less extensive surface of water. To prevent this shifting of the oil layer, we make use of timbers, planks, etc., anchored at intervals along the windward portion of the pool. Such floats tend to keep the oil layer from shifting.

Earth ditches, small pools, etc., are usually oiled from an ordinary garden sprinkling can once a week.

Recently we have introduced the use of a horse drawn sprinkling cart, for oiling ditches situated near roads, and wherever such a cart can be drawn without the ground being cut up by the wheels and hoofs. This method of oiling is very much more economical than hand oiling. We owe this device to Inspector H. R. Trask. (See Fig. 1.) It has been found that repeated application of a heavy coat of the asphaltum-base crude oil to the bottom and sides of earth ditches, especially if this application is preceded by burning the vegetation, tends to retard the growth of grass and serves to considerably increase the stability of earth ditches. This fact is extensively made use of in our work. For burning such vegetation we have been using a home made apparatus, burning crude oil, it being essential that any apparatus we used should be portable, i. e., capable of being carried by not more than four men. We have not been able to find on the market a portable apparatus that would burn crude oil efficiently, for the reason that any apparatus for burning such oil must include an air compressor of considerable capacity. We have found, however, that if a fire is started and a fine spray of crude oil is projected into it, the grass will be consumed in a fairly satisfactory manner.

The following is the usual method of grass-burning used here:

A small barrel fitted with a Myers Barrel Pump is filled with a mixture of ninety parts of crude oil and ten parts of larvacide. To the pump is attached a fifty foot length of one-half inch hose, terminating in a six foot half-inch iron pipe with a spray nozzle on the end. The fire is started on the windward end of the ditch and the spray of the oil and larvacide mixture is directed into it. As the fire spreads, the spray is advanced to leeward. Three men with an apparatus of this nature will burn about six hundred running feet of ordinary earth ditch in eight hours, at a cost of about two cents per running foot. (See Fig. 2.)

The secret of successful oiling is a continuous oil film. It is surprising how readily mosquito larvæ will find a small fault in a large oil surface. Vegetation protruding through the oil layer will destroy its continuity unless the oil layer is very thick indeed.

A simple method of obtaining automatically a thin oil layer on flowing streams of low velocity is occasionally made use of. A bundle of cotton waste, such as is used for wiping machinery, is soaked in crude oil and dropped into a stream with a stone attached to keep it from floating down. This bundle of waste slowly casts off the oil, and a very satisfactory oil layer results.

On large bodies of water, with many stumps, trees, etc., projecting through the water, it is often necessary to make use of a boat for the oiling.

We use about 65,000 gallons of crude oil per month, at a cost of $1.10 per 42 gallon barrel.

LARVACIDE.

The larvacide we use is manufactured by this Division. It is made by adding to 150 gallons of crude carbolic acid, which must contain not less than 15 per cent. of phenols, 200 pounds of well pulverized resin. This mixture is heated at a temperature of 212 deg. F., until a perfectly uniform, thick, dark brown liquid containing no particles of undissolved resin is formed. Thirty pounds of sodium hydroxide, dissolved in about six gallons of water, are then added to the mixture and the heat maintained at 212 deg. until a sample of the mixture readily emulsifies with water. From the time the resin is added and until the mixture is ready to be drained off, continuous stirring must be kept up.

This larvacide, when properly made, will kill mosquito larvæ in a 1 to 1,000 emulsion in water, from one to five minutes. It will kill larvæ in one-half hour in a 1 to 5,000 emulsion. The larvacide is also an effective bacteriocide, having a somewhat greater efficiency than phenol.

It has, however, the following defects: (1) It loses its larvacidal properties when exposed to the air for more than an hour. (2) It is ineffective in sea water and brackish water.

We use larvacide extensively (about 13,000 gallons per month) in treating small collections of water, as, for instance, in machinery, castings, etc., in treating pockets in streams and slow flowing ditches where vegetation and algæ are abundant, and wherever rapid larvacidal action is desired. We also use it in three per cent. emulsion for the disinfection and deodorizing of pit closets, night soil pails, garbage cans, etc. It is also used in ten per cent. emulsion in the destruction of fly larvæ.

The method of use for treating water collections is to apply a sufficient quantity of a ten per cent. emulsion of the larvacide in water, to obtain a 1 to 1,000 to 1 to 5,000 emulsion in the collection of water so treated. For this purpose we usually employ the Myers Knapsack Sprayers. The tanks of these sprayers hold five gallons, and the pump is sufficiently powerful to project a good spray for a distance of six feet from the nozzle. The effect of larvacide being transitory, it is necessary to apply it at sufficiently close intervals to prevent pupation of the larvæ. Conditions in Panama require a weekly application.

DESTRUCTION OF ADULT MOSQUITOES.

This work has met with a measure of success far exceeding the expectations of the most sanguine. The two methods generally used in destroying adults are: catching by hand and catching in traps.

In hand catching we make use of a glass tube about five inches long and one inch in diameter, into the bottom of which is packed a small wad of cotton saturated with chloroform. This tube is kept corked except when in use. When it is desired to kill a mosquito the tube is carefully placed over the insect while it is at rest on some solid object, and if the cotton is well saturated with chloroform, the mosquito instantly perishes and drops into the tube. At the end of the work the mosquitoes are removed from the tube, the species identified, and a record made of the number of each species caught. Ordinary "slappers," a piece of wire gauze fastened to a short handle, are also used.

A trap, specially designed by Inspector C. H. Bath, has been used with success. In localities where there is a considerable flight of mosquitoes, such as Corozal and Miraflores, we have been able to catch thrice the number of mosquitoes in traps than we were able to catch by hand with the most careful daily work. This trap has also been successfully used for fly catching.

The traps are installed in two ways: Either to catch the mosquitoes when they endeavor to enter the building, or to catch them when they attempt to leave the building. We usually combine both methods by installing several traps in each building. The traps intended to catch mosquitoes attempting to enter the building are nearly always installed on the lee side of the latter. Experience has demonstrated beyond a doubt that trap catching is much less successful on the windward side.

By careful hand catching we have been able to control malaria infection so well that in certain construction camps along the line of the relocated P. R. R. the malarial rate has been practically as low as the average rate in our settlements where extensive sanitary work is being done, despite the fact that practically no larvæ destruction or breeding-place eradication has been carried out in the vicinity of these construction camps.

As this paper deals only with the Sanitary Inspectors work in the Canal Zone, I will not discuss the method of malaria prevention by the prophylactic use of quinine.

ANTI-YELLOW FEVER WORK.

Despite the fact that no case of yellow fever originated on the Canal Zone since May, 1906, not one iota of our efforts to eradicate stegomyia has been abated. The Sanitary Inspectors exercise great vigilance in preventing accumulations of water in containers where stegomyia might breed.

The following methods are adopted:

Roof gutters are not allowed, except self-draining, short gutters over entrance.

No water containers are permitted at any house within a 300 foot radius of a public water supply, nor, of course, at any house where there are water connections. In localities more than 300 feet distant from a public water supply, only screened containers are allowed. The Sanitary Department supplies the material for screening one container at each house.

The method of screening barrels is as follows: The top of the barrel is covered with sixteen mesh copper wire. In the center of this is laid a piece of ¼ inch mesh galvanized iron screening a foot square, and on top of this a wooden cover with a hole in its center six or eight inches square. The cover is fastened down with nails and the barrel fitted with a spigot.

The stegomyia eradication measures on the Canal Zone have been so successful that an adult stegomyia is considered a great curiosity, and it is becoming difficult to obtain stegomyia larvæ in the sanitated area of the Canal Zone.

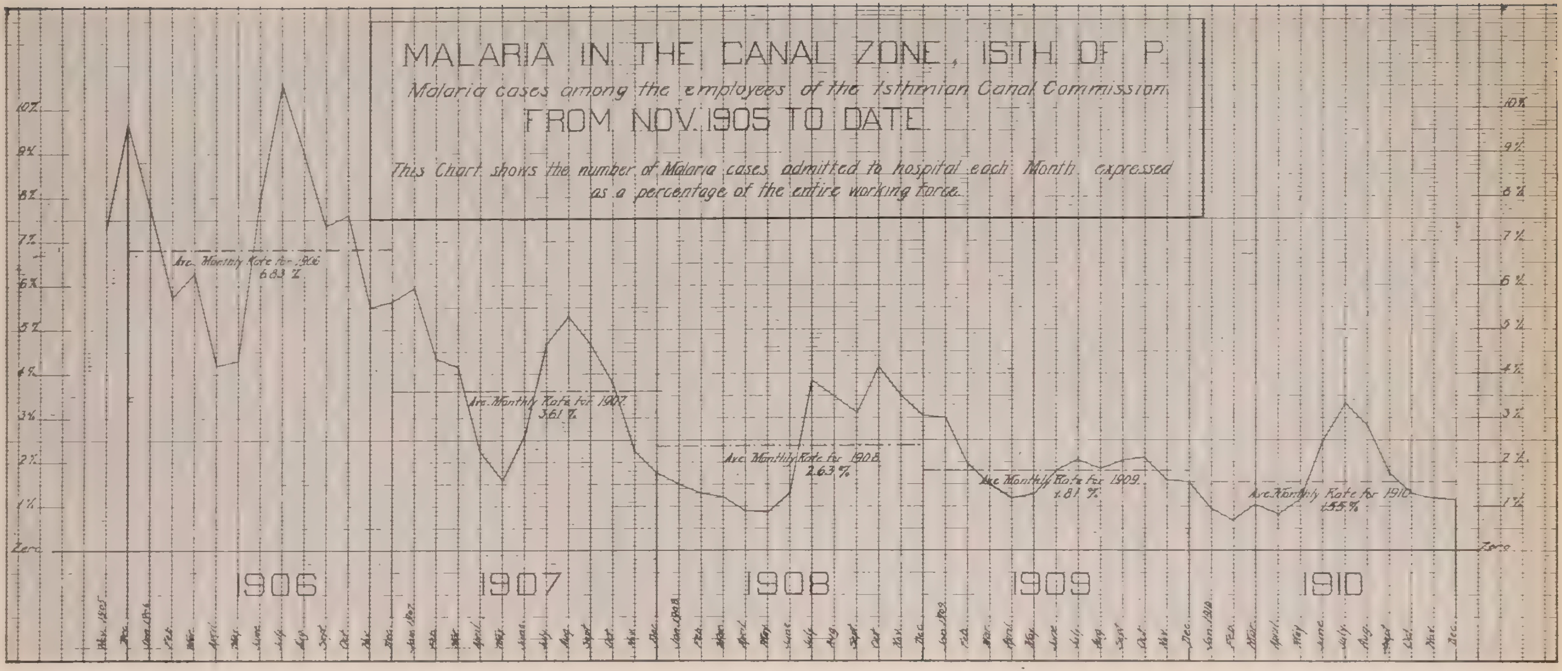
ANTI-PLAGUE WORK.

Within four days travel from Balboa, the Pacific port of entry to the Canal Zone, is situated the City of Guayaquil, where plague is endemic. In addition to the very rigorous enforcement of the quarantine laws, a campaign of rat destruction is continuously carried on by the Division of Zone Sanitation, especially in the settlement of Balboa.

We make use of various traps and poisons. The larger types of cage traps have been the most successful in our hands; and of poisons, a phosphorus paste has given best results. The use of biological products has not met with any success in our work.

All rats caught or found dead are immediately immersed in a three per cent. solution of larvacide, carefully wrapped in a cloth saturated with the same solution, placed in a proper receptacle and sent to the laboratory of the Board of Health.

In the course of the work of rat destruction we have found that rats will soon learn to avoid the trap, if one type is used continuously. The same may be said of poisoned bait. We find it necessary to frequently change the type of traps and the character of the poisons and baits. All traps are carefully scrubbed after


MALARIA IN THE CANAL ZONE, 15TH OF P.
Malaria cases among the employees of the Isthmian Canal Commission
FROM NOV. 1905 TO DATE
This Chart shows the number of Malaria cases admitted to hospital each Month expressed as a percentage of the entire working force.
Ave. Monthly Rate for 1906 6.83 %
Ave. Monthly Rate for 1907 3.61 %
Ave. Monthly Rate for 1908 2.63 %
Ave. Monthly Rate for 1909 1.81 %
Ave. Monthly Rate for 1910 1.55 %
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
Zero
1906
1907
1908
1909
1910
Nov. 1905
Dec.
Jan. 1906
Feb.
Mar.
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Jan. 1907
Jan. 1908
Jan. 1909
Jan. 1910

each catch. This is necessary because rats will avoid a trap in which a catch has been made recently, unless the trap has been carefully cleansed.

One of the earliest measures adopted by the Sanitary Department of the Canal Zone has been the promulgation of a regulation requiring that all dwellings be either elevated not less than three feet above the ground or have concrete floors laid directly upon the ground. This measure operates both in the prevention of ingress of rats into the dwelling and in aiding inspection for collections of water under the houses, which would be very difficult to detect were houses permitted to be erected with less than a three foot clearance between the ground and the floor.

ANTI-TYPHOID AND ANTI-DYSENTERY WORK.

Our reservoirs and their watersheds are kept free from human habitation and trespass, and the water periodically examined chemically and bacteriologically.

In the matter of prevention of fly breeding, the Sanitary Inspectors are required to see to the disinfection of all garbage cans and their thorough daily cleaning. The garbage is either incinerated or buried each day. Stable manure is either incinerated, buried or dumped at a suitable distance from human habitation.

Various methods of fly larvæ destruction in manure piles have been tried, but so far no practicable method of treating manure chemically has been evolved. Incineration we consider the best method of manure disposal. For this purpose we make use of a railroad-iron grate with a rough shed over it. With the addition of a little wood or crude oil, a comparatively small grate area will take care of a surprisingly large quantity of manure. A grate 6 x 4 feet will easily dispose of two wagon loads of manure a day.

Pit closets are required to be fly-proof, and in addition are treated with crude oil at frequent intervals, at least once in ten days.

Bulletins for free distribution among the people have been issued by the Sanitary Department inviting attention to the danger of flies and to their habits, with the idea of interesting the people in the prevention of fly-breeding and the destruction of adult flies.

GENERAL SANITATION.

In connection with the work of general sanitation, the Division of Zone Sanitation has under its jurisdiction grass cutting, screening and fumigation.

In the climate of Panama, especially during the rainy season, grass grows with astonishing rapidity. Actual measurements of a species of grass we commonly encounter here showed a growth of thirty-two inches in four weeks. Tall grass and bush furnishes shelter to adult mosquitoes and tends to hide breeding places; it also prevents evaporation from small puddles formed by rain and seepage and hides from view water-containers that may be carelessly thrown into the grass.

All grass is kept trimmed low within, and adjacent to, settlements. In addition, the grass is cut low along the banks of streams, in swampy areas and places in which water might collect through seepage or rain anywhere within probable mosquito-flight distance of a settlement. The total amount of grass cut per annum approximates 20,000,000 square yards (4,000 acres).

Wherever possible grass is cut with a horse mower, but the bulk of the work must be done with scythes, because in a great many areas where grass is cut for sanitary reasons, the ground is too boggy to admit a horse-drawn machine without danger of horse and machine forming breeding places in the imprints made by the hoofs and wheels.

The Commission buildings used as dwellings, offices and schools for white children are thoroughly screened. It is the duty of the Sanitary Inspectors to see that the screening is adequate and kept in good repair.

In addition to screening inspection, the Sanitary Inspector must look for the thousand and one little defects inherent to frame buildings which would permit the ingress of mosquitoes. In the damp climate of Panama the light wood construction used warps very readily, and a constant watch must be kept to detect and speedily remedy defects.

FUMIGATION AND DISINFECTION.

Sanitary Inspectors carry out all the fumigation and disinfection necessary.

It is the rule here to fumigate only in diseases in the transmission of which insects are concerned.

In bacterial diseases, such as diphtheria and typhoid fever, thorough disinfection of utensils, floors clothing and bed clothes only is carried out.

In fumigation for the destruction of insects and rats we use sulphur in the proportion of five pounds to one thousand feet of air space, with an exposure of from two to four hours.

BUILDING INSPECTION.

The Division of Zone Sanitation is charged with the duty of approving all permits for building and building sites, as well as with the duty of enforcing existing building regulations.

All building permits, with plans and specifications, are taken to the Sanitary Inspector for his approval, and it is the duty of the Sanitary Inspector to see that no building is erected without a permit, or not in accordance with the plans and specifications submitted.

Among the lesser duties of the Sanitary Inspectors are the inspection of restaurants, stores, shops and dwellings for general cleanliness, the inspection of pit closets, manure piles, garbage dumps, etc.

It is also the duty of the Sanitary Inspector to establish and maintain house quarantine whenever this is ordered by the Chief Sanitary Officer, and to direct the impounding, or to personally impound, animals pasturing in areas where their presence may result in a sanitary nuisance.

It would be perfectly pertinent to ask this question: What results have been obtained by the expenditure of all this work and money?

In reply to this question I beg to submit the following:

The sanitary work on the Canal Zone has a three-fold value:

(1) It would have been quite impossible to retain an efficient organization on the Canal work were the sanitary conditions permitted to remain as they were found to be in 1904. The high mortality of yellow fever and plague, as well as the frightful morbidity of malaria, if left unchecked, would soon disperse the force at work on the canal and would deter others from coming here. Indeed, it is not unreasonable to suppose that the Nation would not countenance the prosecution of the work at such cost of life as would undoubtedly result were sanitary measures not carried on in an efficient manner.

(2) Sanitation pays from the economic standpoint, both in preventing loss through absence from work because of illness, and in increasing the efficiency of the force through the prevention of its being honeycombed by a large number of sickly, anemic, and therefore inefficient workers suffering from chronic malaria.

In this connection I wish to invite attention to the following figures:

In 1906, when anti-malaria work was just beginning to be effective, the malaria sick rate (i. e., the number of malaria cases admitted to the hospital per 100 of employees) was an average of 6.83 per cent. per month for the employees. Estimated upon the basis of the present average number, we should have 3,237 employees constantly sick with malaria per month.

The malaria sick rate for 1910 was 1.55 per cent. among employees, which would give 734 cases constantly sick from malaria per month, a decrease of 2,503 cases per month as compared with the rate of 1906. Estimating the average period of illness in malaria at five days, 150,163 days have been gained in 1910. Placing the loss to the Government, in loss of labor and cost of treatment, at $3 per day per man, $450,491 have been saved to the Nation in 1910 on the single item of the malaria sick rate. (See chart.)

Incidentally there were 233 deaths from malaria among employees in 1906 and only 50 in 1910.

The Division of Zone Sanitation expended $501,497 in 1910. Deducting from this the $450,491 saved through the reduction of the malaria sick rate, $51,006 are left to account for as the debit to all the other work of the Division of Zone Sanitation: anti-yellow fever work, anti-plague work, anti-typhoid and general sanitary work, such as garbage collection, grass cutting not essential for sanitary reasons, closet disinfection, etc., *scattered over* 100 *square miles.*

In addition, the Division of Zone Sanitation should be credited with the immense increase in efficiency of a force practically free from malaria over a force in which every other man is ailing and unable to do a real day's work, as is the case where there are a great many people suffering from the effects of repeated attacks of malaria. As is well known, a person subjected to repeated attacks of malaria of a moderate severity, ultimately reaches a point where the malarial infection manifests itself as a cachexia, when the patient is quite able to remain at work, but with his efficiency seriously impaired.

(3) Sanitary work on the Canal Zone served to bring to the attention of the world the possibility of making the tropics habitable for Caucasians, and that the cost of bringing this about need not be prohibitive.

As Col. W. C. Gorgas, Chief Sanitary Officer of the Isthmian Canal Commission, in his address on June 11, 1910, before the American Society of Tropical Medicine, pointed out:

"The medical and hospital care of our employees and their families has cost us two and one-half cents per day per capita (*of population*) and their sanitation nine mills per day. These figures are well within the financial ability of any tropical country."

I am indebted to Col. W. C. Gorgas, Chief Sanitary Officer of the Isthmian Canal Commission, for permission to contribute this paper, and to Mr. J. A. LePrince, Chief Sanitary Inspector of the Canal Zone, for his many valuable suggestions, embodied in this contribution.

THE USE OF ANTITYPHOID VACCINE IN PUBLIC INSTITUTIONS AND AMONG CIVILIANS

F. W. Hachtel, M.D.,
and
H. W. Stoner, M.D.
From the Bacteriological Laboratory of the State and City Boards of Health, Baltimore, Md.

So much has been written on the prophylactic inoculation against typhoid fever in the last few years that it seems almost like an act of supererogation to make a further report on this same subject. However, this work has been largely limited to military life, and as our inoculations have been given to inmates of institutions and to civilians, we feel that this is sufficient apology for adding to the literature upon the subject. Again, it is more with the hope of stimulating others to use antityphoid vaccine in private life than with the intention of proving the efficacy of this method of reducing the attack rate from typhoid fever, that we present our results. Indeed, no further proof of the efficiency of vaccination against enteric fever need be adduced than citing the brilliant results obtained at the encampment of the Maneuver Division at San Antonio, Texas.

Nelson and Hall[1] state that of approximately 12,000 men at this camp only two became infected with typhoid fever. Of these one was a teamster who had never been inoculated, the other a private of the hospital corps who had received two doses of the vaccine. These writers are of the opinion that with these cases of typhoid and with typhoid carriers present in the command, an epidemic of enteric fever could not have been prevented had the troops not been immunized.

We were led to take up this work by the report of Major Russell in the Johns Hopkins Hospital Bulletin for March, 1910, and by a knowledge of the excessive attack rate from typhoid fever among physicians, nurses and attendants in hospitals. Thus Joslin and Overlander[2] found that in the years 1902-1906 inclusive the morbidity rate for the nurses in six Boston hospitals was 161 per 10,000, as compared with 20 per 10,000, which was the approximate attack rate for the whole population of Massachusetts. These writers conclude that "the hospital nurse in Massachusetts is about eight times as liable to contract typhoid fever as the ordinary citizen." At the time this paper was presented our statistics from the local hospitals were very incomplete and showed at that time an attack rate of 1.4 per cent. or of 140 per 10,000 among nurses and hospital attendants. Since then more nearly complete figures show the morbidity rate for the five years preceding the inoculations to average about 500 per 10,000 among nurses. Since in the city at large the attack rate has ranged from 24.5 to 42.2 per 10,000,* in these hospitals the nurses and attendants appear to be from about 12 to 20 times more likely to become infected than the citizens of Baltimore.

Read at the Annual Meeting of the American Public Health Association, Havana, Cuba, December, 1911.

* As the report of typhoid cases in Baltimore is not complete these figures are estimated from the reported deaths on a basis of a 10 per cent. fatality.

[1] Nelson and Hall. Jour. A. M. A., LVII., 22, 1759.

[2] Joslin and Overlander. Boston Med. & Surg. Jour., CLVII., p. 247.

Our first inoculations were made in March, 1910, at which time we vaccinated volunteers from the laboratory force of the State and city boards of health, including ourselves. Immediately following this, through the kind efforts of Dr. Wm. Royal Stokes and Dr. Pearce Kintzing, we were enabled to immunize the resident staff and nurses of the Mercy Hospital and of the Franklin Square Hospital. Altogether ninety-nine inoculations were made in 1910; these were given to 68 of the nurses, resident staff and attendants at the Mercy Hospital, 16 of those at the Franklin Square Hospital, 13 of the laboratory force of the city and State departments of health, and 2 medical students. This year (1911) through the courtesy of various physicians we have been allowed to introduce this prophylactic method into a number of hospitals in the city and State, so that up to the present time between 1,600 and 1,800 individuals have been inoculated with the vaccine prepared by us.

We have been able to secure records of the effects of the vaccine in 1,575 cases; we ourselves inoculated 71 of these, this number embracing the Health Department laboratory force and volunteers from the College of Physicians and Surgeons and the medical school of the University of Maryland. Thirty-two were private patients of numerous physicians, while the total number was distributed as follows:

Springfield State Hospital, inoculated under the direction of Dr. J. Clement Clark	887
Spring Grove Hospital, inoculated under the direction of Dr. J. Percy Wade	330
Mercy Hospital, inoculated under the direction of Dr. Eckhart	68
University Hospital, inoculated under the direction of Dr. Howard J. Maldeis	88
St. Joseph's Hospital, inoculated under the direction of Dr. Eugene Hayward	34
Homeopathic Hospital, inoculated under the direction of Dr. H. M. Stevenson	11
Franklin Square Hospital, inoculated under the direction of Dr. Pearce Kintzing	16
St. Agnes Hospital, inoculated under the direction of Dr. J. A. Chatard	38
Private cases, inoculated under the direction of numerous physicians	32
Physicians, students, laboratory force, etc., inoculated by the writers	71
	1575

Before proceeding with an analysis of the reports we have received from these institutions we shall briefly describe the preparation of the vaccines we employed. In the year of 1910 we made our vaccine from six strains of the typhoid bacillus, five of which were obtained from recent blood cultures. The sixth organism was one that had been in the laboratory for several years. A mixed culture of these bacilli was made in bouillon and was incubated for 24 hours and this was inoculated on agar. Twenty-four-hour-old cultures were washed off with sterile salt solution and the organisms were killed by heating at 58° C. for forty-five minutes. The vaccine was preserved by the addition of 0.25 per cent. trikresol. In 1911 our vaccine was made from a single strain of the typhoid bacillus furnished us through the courtesy of Major Russell, this being the same organism with which the army has been inoculated. The preparation of this vaccine was similar to that previously described except that the organism was killed by adding 0.5 per cent. of carbolic acid. Our vaccines were standardized by Wright's method and by the modification of Wright's method first described by Harrison. Aerobic and anærobic cultures were made and animals were always inoculated before any of the vaccine was distributed.

The method of preparing the arm for the administration of the vaccine has varied at different times. At Springfield Hospital and Spring Grove Hospital the arm was thoroughly cleaned and tincture of iodine was applied before and after the inoculation. Previous to this we had always advised the thorough cleansing of the arm and the application of carbolic acid or bichloride of mercury solution before the injection. In our own cases the arm was rubbed briskly with 95 per cent. alcohol.

The doses employed have varied somewhat, but in our earlier cases we administered 125,000,000, 250,000,000 and 500,000,000 dead typhoid bacilli at intervals of 7 to 10 days. In 184 of our later cases doses of 250,000,000, 500,000,000 and 1,000,000,000 were used.

Of the inoculated 264 were between 20 and 30 years of age, 938 were between 30 and 40 years old, 2 were between 50 and 60 years, while the age of the remaining cases was not determined.

Proceeding now to an analysis of the reports we find that local tenderness and redness were present in every case, but needle abscess or infection never supervened. Other reactions caused by the injections were general malaise in 733 cases; headache in 739 cases; muscular pains in 79 cases; nausea and vomiting in 38; chills in 15 and fever in 804 cases. Systemic symptoms were absent in 771 or nearly 49 per cent. of the cases.

As previously stated there was no fever following the injections in 771, or 48.9 per cent. of the inoculated. In 737, or 46.7 per cent. of the cases the temperature was 101° F. or under; in 52 or 3.3 per cent. it ranged from 101° F. to 103° F.; in the remaining 15 or 0.9 per cent. the temperature was 103° F. or over. Thus 95.6 per cent. of those immunized had either slight reaction or none at all; 0.9 per cent. had severe and 3.3 per cent. moderately severe general disturbances.

The rise in temperature followed the first inoculation in 166 cases; the second inoculation in 288; the third inoculation in 391; the first and second in 37; the second and third in 9; the first and third inoculation in 6, and the first, second and third inoculations in 3 cases.

In those who had systemic symptoms, the latter disappeared in from 1-6 hours in seven cases. In 85 cases the symptoms persisted from 6-12 hours; in 89 they lasted from 12-24 hours; in 43 cases, from 24-48 hours; in 5 cases, from 47-72 hours; in 6 instances, from 72-96 hours; in one person for 5 days, and in two women over 10 days. One of the latter was a patient suffering from chronic mania at the Springfield Hospital. In this instance a low grade of temperature persisted for two weeks and tuberculosis was suspected; and while no sputum could be obtained for examination for the tubercle bacillus, the patient had a hacking cough and dullness over a portion of one lung. The other was a very hysterical woman and suffered from gastric distress for 10 days following inoculation. She, however, has had similar attacks both before and since that time. She also suffered from chronic constipation. In another institution two tuberculous persons were inoculated; one of these reacted with moderate severity, and the other but very slightly to the vaccines.

The polyvalent vaccine was used to inoculate 99 and that made from the Russell strain in injecting the remaining 1,476 people. The reactions produced by the different vaccines were as follows:

	Polyvalent Vaccine		Vaccine from Single Avirulent Strain	
Reaction	Number	Percentage	Number	Percentage
No reaction.......	56	56.0%	715	48.4%
Slight (Temperature normal—101° F.)	24	24.0%	713	48.3%
Moderately severe (Temperature 101°-103° F.)...	16	16.0%	36	2.4%
Severe (Temperature over 103° F.)	3	3.0%	12	0.8%

The above table shows that the polyvalent vaccine was more often followed by no reaction than was the other type. On the other hand 96.7% of the cases receiving doses of the single avirulent strain had either no fever or a temperature less than 101° F., while only 80% of the other cases showed the same result; moderately severe and severe reactions, therefore, more frequently ensued after the administration of the polyvalent type.

It is too early to draw any conclusions as to the result of these inoculations in the prevention of typhoid fever among the classes of individuals vaccinated. However, none of the people inoculated in 1910 and 1911 have as yet developed typhoid fever. Of peculiar interest is the fact that, at one of the hospitals, a nurse who was out of the city at the time the inoculations were made developed typhoid fever. At another hospital a nurse who was on her vacation at the time the others were immunized also developed enteric fever. At a third, where the nurses were inoculated in 1910, two out of eight who were not immunized contracted typhoid fever in 1911. At Springfield Hospital 887 out of a total number of 1,220 employees and patients were vaccinated. The attack rate from typhoid fever at this institution for the past five years has been approximately 1% a year, or about 12 cases each year among the inmates of the hospital. During the past summer only three cases occurred and these were among the 333 individuals who had not received the vaccine.

In conclusion we believe that the vaccine is of undoubted value in the protection against typhoid fever, and owing to the undue incidence of this disease on hospital nurses and attendants its use among these classes is urgently recommended. Also in hospitals for the insane and mentally deficient inoculation can be employed in reducing the number of cases of this disease. In such institutions, however, great care should be exercised in the selection of cases for inoculation, since we have very little knowledge concerning the effect of the vaccine on persons of advanced years or on those suffering from such chronic organic disturbances as arterio-sclerosis and cardiac and renal diseases.

Also the general adoption of this preventive measure in private life would undoubtedly produce a lowering of the barbarious typhoid attack rate. For this measure to be popularized the discomfort following the vaccinations must be as slight as possible. It would therefore seem that concerted efforts should be made to determine the minimum dose that will give the maximum protection.

This problem is one of great complexity. On the one hand individuals vary greatly in their susceptibility to the typhoid endotoxin, as is clearly shown by the diversity in the reactions to equal quantities of the same vaccine administered under similar conditions. On the other hand, of a number of persons on whom we studied the amount of bacteriotropic substances produced, we found great variations in their concentration in the blood. Similar differences are also noticed when rabbits of the same weight are inoculated with equal quantities of the identical stock of vaccine. Again, to what extent the concentration of these bodies in the blood-serum is an indication of the degree of protection is also unknown. It is known that there is at first a rapid decrease in their amount followed by a very slow decrement to the normal quantity. There is also no correspondence between the severity of the reactions and the amounts of bacteriolysin, opsonin and agglutinin produced.

All things considered, however, we believe that it is unwise, except in the case of very vigorous people such as the regular troops, to give an initial dose of more than 250,000,000 dead typhoid bacilli, doubling the amount at each of the succeeding inoculations. In the highly neurotic and in children the first dose should be even smaller than this. In children the dose should be based on the body weight, using 150 pounds as the standard. In the administration of anti-typhoid vaccine to the general public it may be found better to start with an initial inoculation of 125,000,000 and give three other doses of 250,000,000, 500,000,000, and 1,000,000,000 each at intervals of 7-10 days; for if such a method would materially lessen the discomfort of the immunization a larger number of persons would submit to vaccination against enteric fever. This is a condition greatly to be desired, for with every individual directly protected there will ensue a greater proportionate protection of the community at large.

We wish to extend to the physicians under whose care the inoculations were made our sincere thanks for their kindness in allowing the use of the vaccines in their respective institutions and for furnishing us with the records for the compilation of this preliminary report. We also wish to thank Dr. Stokes for the interest he has taken in this work and for the aid which he has at all times generously extended to us.

A SYNTHETIC MILK MEDIUM

H. A. Whittaker, B.A.,

Laboratory Division, Minnesota State Board of Health.

Natural milk, which has long been used as a medium for bacteriological growth, presents many points which detract greatly from its value in exact determinations.

For several years there has been used in this laboratory an artificial milk as a substitute for natural milk. This medium* consists of a solution of nutrose and lactose in distilled water. It has many advantages over the natural milk. It does, however, present certain disadvantages, in that nutrose is a more or less proprietary article, the exact composition of which is not generally known. It is said to be a sodium-phosphate-casein. In order to obviate this difficulty, experiments have been undertaken with definite solutions of caseinogen dissolved in distilled water, to which is added sodium hydrate, calcium chloride, and a certain amount of lactose. Varying amounts of each of the ingredients have been tried and the following method of preparation has been found to give a very satisfactory medium: Fifteen grams of pure caseinogen are dissolved in 100 c.c. of a 1 per cent. solution of sodium hydroxide in distilled water. Eighteen to 24 hours may be required for a complete solution. After the caseinogen is dissolved the solution is diluted to about 900 c.c. with distilled water. Ten grams of lactose and 0.1 grams of calcium chloride are added and the solution made up to 1,000 c.c. with distilled water. It is then neutralized and made + 0.3 with N/1 HCl, using phenolphthalein as an indicator. This medium is sterilized in an autoclave at a 107 degrees for 20 minutes. The finished product should be a clear, transparent solution. When the medium has a reaction of +0.3 about 24 hours are usually required for coagulation with an active strain of B. coli. When the reaction is neutral a somewhat longer time may be required to produce similar results. This medium has been thoroughly tested on the routine test for B. coli and apparently meets all requirements. It has several advantages over artificial milk previously described, *viz.*:—

1. It is easy to prepare.
2. It has definite composition.
3. Its transparency makes it easily possible to distinguish between precipitation and coagulation.
4. The materials required for its manufacture can be kept constantly on hand.

Read before the Laboratory Section, American Public Health Association, Havana, Cuba, December, 1911.

* *American Journal of Public Hygiene, Vol. XX, No. 3, August, 1910.*

FURTHER OBSERVATIONS ON CHEMISTRY OF DISINFECTANTS

Dr. Wilhelm Dreyfus,

New York.

In my paper read last year before this Section, I divided the Chemical Disinfectants which are most commonly used in sanitary practice, into six distinct classes, but owing to limited time, was not able to describe more specifically the chemical nature of each individual group. I feel that Health Officers, Laboratory men and others in charge of sanitary work, to whom the proper selection of a disinfectant is entrusted, should be as familiar with the chemical, physical, bacteriological and physiological properties of the available products, as the analytical chemist must be with the purity of his reagents, or the synthetical chemist with the nature of the chemicals he uses in his research.

I will briefly recapitulate the six classes into which disinfectants should be divided, namely:

1. Reducing agents.
2. Oxydizing Agents.
3. Absorbents and Deodorants.
4. Toxic Agents and Precipitants.
5. Producing Chemical Compounds.
6. Coal-Tar Products.

I will also give you what should be considered the Ten Commandments of a Disinfectant, namely:

1. High Germicidal Power.
2. Stability in Presence of Organic Matter.
3. Homogenous Composition.
4. Ready Solubility in All Proportions.
5. Non-Poisonous to Man or Higher Animals.
6. Non-Corrosive to Skin or Metals.
7. Power of Penetration.
8. Economy in Cost.
9. Power to Deodorize.
10. Power to Remove Dirt or Grease.

If we submit the six classes of Disinfectants mentioned above to the scrutiny of these Ten Commandments our choice must fall invariably on Coal-Tar Disinfectants. However, during the last year I had occasion to examine the Bulletins of nearly all our State Boards of Health, and they all, with few exceptions, religiously recommend, under approved disinfectants:

Fire, Water, Chloride of Iron, Milk of Lime, Bi-Chloride of Mercury, Formaldehyde and Carbolic Acid.

These bulletins further call attention to the great danger in the use of some of these approved disinfectants, such as toxicity, corrosion and irritation to those

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Read before the Laboratory Section, American Public Health Association, Havana, Cuba, December, 1911.

that are called upon to apply them, and yet in spite of all these disadvantages, very few Boards include in their recommendations "commercial coal-tar products" of approved bacteriological efficiency, although they fulfill better than any others the Ten Commandments of an ideal Disinfectant; even the coal-tar disinfectants described in the United States Pharmacopœia are never recommended. Furthermore, in purchasing Bi-Chloride of Mercury, Carbolic Acid and Formaldehyde no bacteriological efficiency is guaranteed, and unless the purchaser makes a chemical analysis of the product, he has no information as to its value as a germicide; with reliable coal-tar disinfectants a guarantee of the value of the product is furnished, based on recognized bacteriological tests. Whether the discrimination is due to lack of knowledge on the part of the officials of the chemical advantages and the bacteriological efficiency of the coal-tar products, or whether the fact that these coal-tar disinfectants are what is termed "proprietary," is not in my province to answer.

Before entering on a discussion of these facts, however, I will criticise the chemical disinfectants which do receive the sanction of State and Municipal Boards of Health in their regular bulletins, namely, Bichloride of Mercury, Chloride of Lime, Carbolic Acid, Milk of Lime, etc.

We find that *Bichloride of Mercury* is still considered the "non plus ultra" of disinfectants, which affords a farcial display of ignorance on the part of those responsible, or indifference for consideration of progressive work. *Bichloride of Mercury* is precipitated by albumen, soap, etc., and is moreover readily converted into an insoluble sulphide when brought into contact with organic matter containing sulphur, which is quite inert so far as germicidal action is concerned. Chick and Martin have proven without a doubt the fallacy of Bichloride, when they say, "Whereas very low concentrations of mercuric chloride are effective against B. typhosus, or B, pestis, with the method employed, viz., treatment with H_2S, at the end of 15 minutes, it was found impossible to kill Staphylococcus pyogenes aureus by treatment with a 5 per cent. solution of Bichloride for this length of time."

The *Oxydizers,* such as Chloride of Lime and Permanganate, under certain conditions, have a value as disinfectants; but when diluted with organic fluids, such as urine, this value rapidly diminishes, according to tests made by Sommerville. Geppert states in a paper, from which I think it is well to quote, "I have found that the layers in which the infectious organisms lie, may offer far higher resistance to the disinfectant than the bacteria themselves. The question of how to penetrate the layers in which the organisms are imbedded is the most important of all. The resistance of the infective organism to the disinfectant is of an importance wholly inferior to that which a minute layer of organic matter can interpose to the penetration of the disinfectant." Gruber showed that for efficient disinfection of cattle cars, a solution of Chlorinated Lime had to be preceded by a thorough cleansing with water under pressure, and preferably at a high temperature; that the Chlorinated Lime solution had then to be applied six or seven times before satisfactory results could be obtained.

As regards *Carbolic Acid,* I would like to emphasize that under this term anything is included from pure Phenol to 95 per cent. liquid carbolic. The product, as we well know, is difficult to dissolve in water, and is highly corrosive. The bulletin of one of the State Boards of Health calls attention to this fact when they say, "When seven ounces of carbolic acid to a gallon of water are used for washing casings, floors, etc., care should be taken not to immerse the hands or other parts of the body in this solution." As to bacteriological efficiency of Carbolic Acid, Koch said as far back as 1881, "That a 5 per cent. solution of Carbolic Acid is incapable of trustworthy disinfection, even when the objects to be disinfected lie for 24 hours in a quantity of the solution, so large relatively to the bulk of the objects, that there can be no question whatever of a weakening of the disinfectant by its absorption or decomposition."

Milk of Lime, which acts as an absorbent and deodorant, may be used with great advantage as a whitewash, but it does not deserve any mention under the head of germicides; unless it is freshly prepared each time, it is apt to form the inert carbonate.

If the lack of knowledge regarding germicidal efficiency is the cause of the discrimination against coal-tar disinfectants, I will say, since we have now in the "Hygienic Laboratory Phenol Coefficient Method," developed by Doctors Anderson and McClintic, a standard bacteriological method for testing disinfectants, no such fears need be entertained.

If, however, the second reason should prevail, namely: prejudice against so-called proprietary products, I would consider it a most unjust stand to take, for it would simply mean protection of the interests of one set of chemical manufacturers to the detriment of those of another set of chemical manufacturers.

You all know that Corrosive Sublimate, Carbolic Acid and Formaldehyde are not natural products; they are not found in nature, but are products of a chemical industry, the same as coal-tar products; furthermore, in the case of Formaldehyde, this industry absolutely represents a monopoly in this country. As a chemist, interested in this branch, I know that the production and sale is in the control of one company, and our protective duty prevents any competition from abroad.

A disinfectant to be trustworthy in practice must have not only a considerable stability against decomposition by organic matter and a considerable capacity for penetrating it, but also a high specific disinfectant power, so as to allow it to give adequate disinfection in the dilutions which enable it to work at its best. In my judgment these conditions can only be fulfilled for dirty surfaces by using a soap-disinfectant of known and high bacteriological efficiency, and well-marked cleansing power. The following practical test is a vivid demonstration of the usefulness of coal tar disinfectants.

With a view to compare laboratory results obtained with the coal-tar emulsions with those in practical work and in order to determine the cleansing qualities as compared to soap and water, the following practical test was carried out:

Two coal-tar products and Formaldehyde 37 per cent. strength were used, showing the following coefficient when tested by the "Hygienic Laboratory Phenol Coefficient Method."

Disinfectant.	Coefficient.
Coal-Tar Product A	5.41
Coal-Tar Product B	2.72
Formaldehyde 37 per cent	0.337

Several railroad cars were cleaned with each disinfectant; samples of scraping were taken from different portions of the floor of the car, both before and after cleaning. The scrapings taken from the floor after cleaning were from points immediately adjacent to the place where scrapings were taken before cleaning. These scrapings after proper preparation were examined to determine the bacteria contained therein. The cleaning of the cars was handled by a regular force and in the regular manner according to a certain established railroad practice.

FORMALDEHYDE, 37 PER CENT.

Varying percentages of Formaldehyde were used in the manner described above, ranging from one part by weight, commercial strength Formaldehyde, to 100 parts of water, from 1 per cent. solution to a 3 per cent. solution. It was found necessary to use a 3 per cent. solution of Formaldehyde before germicidal results were obtained, and with a 3 per cent. solution of Formaldehyde the odor was so strong and pungent as to make it impractical to be used.

COAL-TAR PRODUCT A.

Varying percentages of the disinfectant were used in the manner described above, ranging from 0.38 per cent. to 1.93 per cent., and it was found necessary to use a solution of at least 1.93 per cent. of the disinfectant before satisfactory germicidal results were obtained. With this percentage of disinfectant, satisfactory cleansing qualities were obtained, but in this case the paint or varnish surface, after cleansing, seemed to be slightly dimmed, requiring an additional washing with clear water.

COAL-TAR PRODUCT B.

Varying percentages of the disinfectant were used, ranging from ¾ of 1 per cent. to 5.32 per cent in the manner described above. It was found necessary to use 5.32 per cent. of the disinfectant to secure proper germicidal results, and with this amount of disinfectant satisfactory cleansing qualities were obtained, except the paint or varnish on the floors or sides of the cars seemed to be slightly dimmed and required a rinsing with clear water.

Of the three disinfectants considered above, Coal-Tar Product A has the greatest efficiency, based on the Phenol Coefficient and as a cleansing material in scrubbing cars it is far superior to Formaldehyde.

The penetrating power of coal-tar disinfectants is proved by their relative efficiency, when tested by the Glass Rod, the Silk Thread and the Hygienic Laboratory Phenol Coefficient Methods, which is also corroborated by the work of Dr. Francis H. Slack, published in the 29th Annual Report of the Boston Board of Health; this would tend to minimize the erroneous conclusions as to penetrating power, arrived at by Drs. Arthur I. Kendall and Martin R. Edwards in their work, published in the *Journal of Infectious Diseases,* Volume 8, March, 1911.

In that investigation the authors at the suggestion of Dr. Rosenau exposed test organisms in infected cylinders of agar of definite diameter to the germicide for definite periods of time.

To quote from their publication, they say, "At stated intervals the agar cylinders are removed from the disinfecting solutions and washed with sterile water. A plug of agar about 3 mm. in diameter is then removed from the cylinder, or cylinders, by means of quill tubing. This plug of agar is taken from the center of the agar cylinder, along its long axis. It is placed in sterile broth and incubated at the body temperature for several days, during which time observations are made to determine the presence or absence of growth. By comparing the results obtained with a given disinfectant and those obtained under the same conditions with carbolic acid as a standard, a ratio may be established which expresses in terms of carbolic acid the combined germicidal and penetrating power of the bactercidal substance in question."

They find that Formaldehyde, even in relatively weak solutions, appears to be the most efficient of the germicides tested, which included carbolic acid, chloride of lime, and bichloride of mercury, and two coal-tar disinfectants, one of which possesses a Hygienic Laboratory Phenol Coefficient of 16. The authors themselves admit that there are objections to their method, one of which is, that agar is a substance not met with in nature, and that the results obtained might conceivably not be applicable in practice. They seem to forget that the reason for their high results obtained with Formaldehyde is due to a process of osmosis, in which the gas of the Formalin solution is absorbed by the moist agar, and retained chemically, and therefore such a method of testing the penetrating power of disinfectants is absolutely unreliable and contradictory to the practical findings as described in my test referred to above.

The percentage of waste which occurs in the use of chemical disinfectants is probably higher than with any other routine practice, chiefly because of their injudicious selection and insufficient dosage. Of these two characters the most difficult to check is the intrinsic efficiency of the preparation, and I think it is mainly due to this difficulty of expressing the bacteriacidal efficiency in chemical terms that so many inefficient substances are used, allowing avoidable infection to be spread, and large sums of money simply thrown away.

It would be detrimental in the highest degree to chemical and bacteriological research without which continued progress is impossible, if the field is not open to any efficient disinfectant, without putting the consumer at the disadvantage to be at the mercy of a single proprietor. The real question to be decided is the means by which an effective control can be provided over the capacity of a disinfectant to disinfect, and, given compliance with the essential conditions which I have named, there is great practical advantage in so specifying the specific efficiency of a disinfectant that it may be open to all comers.

In this way, after a preliminary examination on the other points necessary to a satisfactory disinfectant, which points can be well and definitely expressed in a specification, and readily verified on deliveries, any number of disinfectants can be compared directly to the value of their disinfecting power.

In concluding I may be permitted to outline the necessary points of a proper specification which State Boards of Health and other institutions should adopt.

SPECIFICATION.

The disinfectant fluid submitted shall be miscible in water in all proportions to form a homogeneous emulsion and shall be free from sediment to run freely from the package at all times. It must be non-poisonous, non-corrosive, and non-caustic. It must possess a Phenol Coefficient of not less than 4 when tested by the "Hygienic Laboratory Phenol Coefficient" method of the U S. Public Health and Marine Hospital Service, against cultures of Bacillus typhosus. The deliveries of the successful bidder will be tested from time to time, under the above mentioned method, and should any delivery be found inferior to the sample specified, the contractor will forfeit the sum of $100 for every such failure.

American Journal of Public Health

Official Organ of the American Public Health Association.
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. MARCH, 1912. Number 3.

$2.00 a year. 20 cents a copy.
LIVINGSTON FARRAND, M. D., Editor SELSKAR M. GUNN, B. S., Managing Editor
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All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

SCARLET FEVER AND THE SCHOOLS

The relationship between the aggregation of children in schools and the rate incidence of some of the commoner communicable diseases, has always been an important question. It is of particular significance in the case of scarlet fever. A casual consideration of the general facts leaves one in doubt as to the relative merits of the two contentions, one of which, insisting on the close connection between scarlet fever and the school months, the other stoutly maintaining that scarlet fever incidence is only slightly affected through the bringing together of the children.

It is recognized that there is a serious loss of the children's time resulting from the closure of schools, and from the wilful detention from schools by nervous parents, a nervousness which is of course oftentimes excusable. It seems probable that much of this is unfruitful as a method of preventing the spread of the disease. The arguments presented in a recent paper by Dr. D'Ewart, of the Manchester (England) Board of Education, which is abstracted in the Public Health notes in this issue, point out forcibly the dangers of jumping at too rapid conclusions to explain the well recognized increase of scarlet fever in the fall.

Scarlet fever control is a problem which worries and perplexes health officials. Many modern methods of sanitation have apparently failed to cope with this disease, and decrease in both morbidity and mortality are hard to bring about even where there is a good system of inspection of schools.

Is there not too much of a tendency to patiently await the discovery of the scarlet fever organism with the expectation of finding a solution of the problem there? While the discovery of the organism would be a noteworthy advance, yet it does not follow that it is at all a necessity. Yellow fever and smallpox can be effectively controlled as the result of observations and researches made without any exact knowledge of the parasites of the diseases.

We shall have to change our methods if we are going to effectively combat scarlet fever. In order to find out what changes are indicated, we need to have thorough epidemiological and statistical studies of scarlet fever in different sections of the country.

All kinds of variations in the number of cases and deaths are to be noted in a survey of scarlet fever returns from the large cities of the United States. A Southern health officer has suggested the possible relationship of temperature to explain the paucity of cases in his city. Opportunities for school infection are certainly not lacking there.

The thorough studies on typhoid fever that have been made in several American cities during the past decade suggests the need for investigations of a like nature for scarlet fever. The JOURNAL will be glad to receive communications from public health and education authorities on the whole question of the influence of schools as propagators of communicable disease.

A NOTABLE INNOVATION

It is interesting to look back over the span of years since the New York Department of Health placed tuberculosis on the list of reportable diseases. At that time, there was much opposition to the plan and at first the Department only required the reporting of cases by institutions, it being merely requested that physicians report their private cases. Eventually the ordinance became mandatory for both institutional and private cases. The recent decision of this same Health Department to treat social diseases in a like manner is of unusual importance.

The first step has been taken in requiring the reporting of all cases of social diseases by institutions and dispensaries, and physicians are requested to report cases coming to their attention in their private practice. It will be especially important to note how many cases of the latter will be reported. It is to be hoped that the physicians will respond and notify the Department of their cases, withholding the names if they so desire. No one denies the value of having a full reporting of cases of communicable disease, but the difficulties and pitfalls that beset the path of venereal disease control are many and differ in various respects from those confronting the control of tuberculosis, diphtheria, etc. Each step must be made with extreme caution, as a misstep might retard progress very materially. We wish the New York Department of Health success. If it can be demonstrated that this metropolitan city can get good results from this procedure. it might be a great incentive to other communities to take similar action.

NOTICE TO HEALTH OFFICERS

It is the intention of the editors to devote a special section of the JOURNAL to a review of the annual reports of state, provincial, and local Boards of Health. In order that this may be done in a satisfactory manner, it is requested that the managing editor be placed on the mailing list of such departments so that there may be no delay in bringing to the attention of the readers of the JOURNAL the important work being executed in all parts of the country.

It is suggested that all other printed matter (Bulletins, Leaflets, etc.) issued by such departments be also forwarded. A column devoted to personal items would likewise prove of interest to our subscribers and notes of this kind will be gladly used whenever possible.

All reports, bulletins, notes, etc., should be sent to the Managing Editor, AMERICAN JOURNAL OF PUBLIC HEALTH, 755 Boylston Street, Boston, Mass.. U. S. A. A circular letter containing these requests will shortly be mailed to the State, Provincial and Municipal health departments. It is suggested that public health officers do not wait for this, but place the name of the Managing Editor on their mailing list without delay. It is earnestly desired to have the JOURNAL thoroughly represent the Public Health authorities of the four countries belonging to the American Public Health Association and to that end the co-operation of everyone interested is needed.

A FALSE ALARM OF YELLOW FEVER AND HOW IT WAS MET BY THE HEALTH DEPARTMENT

DR. JUAN GUITERAS,
Director of Health, Cuba.

As a plea for the prompt and frank declaration of the appearance of epidemic diseases, and as a demonstration of what can and should be done on such occasions, I believe that it may be of interest to narrate our recent experience with a false alarm sounded from Banes, reporting a supposed outbreak of yellow fever among field laborers in a large sugar estate there.

I claim that you cannot meet such an emergency if you pretend to hide things. On that account as soon as we had confirmation from competent authority to the effect that one of the suspicious cases at Banes might be yellow fever, for the purpose of sanitary precaution we made it known to our neighbors that we were investigating the matter.

The town of Banes, with its sugar mill, is situated at the other end of the Island in the Eastern province, and upon a sub-branch of the Cuba Company Railway. With respect to the time, distance and means of communication, Banes is as far from Havana as New Orleans is from Washington, with the disadvantage in our case that passengers and material have to transfer twice on the road.

BARRACKS READY FOR FUMIGATION

The clinical data which I am about to review briefly are furnished by Doctors Mario G. Lebredo and Juan Ruiz Ariza. The prompt execution of the measures of defense we owe to Dr. Gabriel Custodio, chief of the disinfection department, and his assistants.

On Sunday, the 19th of November, we received a telegram from Dr. Ariza, health officer of Banes, which stated that he had "three cases of confirmed typhus icteroides, properly screened, in the United Fruit Company Hospital." Yellow fever has more than once been associated with fruit companies, and Dr. Ariza is

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Read before the American Public Health Association, Havana, Cuba, December, 1911.

a careful student. That same night, with the approval of the Secretary, Dr. Custodio with a capataz and 10 experienced men of the disinfection brigade, embarked on the first train with all the necessary material. Dr. Lebredo as yellow fever expert also accompanied the party. They arrived in Banes late Monday night, and by Tuesday the sulphur pots were fuming in the barracks occupied by the infected gang of men. The local health officer with his men assisted in the operation.

About 25 persons were quartered in the several buildings, one of which was a palm hut, and all of the structures together had a housing capacity of 75 men. On Friday and Saturday, the 24th and 25th, the cases were decided not to be yellow fever and the party returned to Havana.

The diagnosis of yellow fever during the first three days is not always easy. We can understand very readily that there may be vacillations at that time and even later, but there should be no mistake in the end. The final decision should be right, and the sanitarian must learn to wait for it. I believe that there is less likelihood of making a mistake than with any other of the infectious diseases for which we do not possess a positive laboratory method of diagnosis.

BUILDING COVERED FOR FUMIGATION

The following facts concerning the four suspected cases of yellow fever are presented.

The examination of the temperature charts of the patients showed decidedly remitting curves, falling at times below the normal. This readily suggested a diagnosis of malaria. In the case of one of the patients, José Vazques, who was infected with benign tertian malaria, this was easily done on the field. The other patients were found to be infected with *Laverania malariæ* or tropical tertian malaria and the parasites were demonstrated after careful examination in the laboratory.

Other general considerations that excluded the diagnosis of yellow fever are the following:

1. From the viewpoint of yellow fever the charts of the patients were considered hyperthermic. The temperatures rose to 40 deg. C. (104 deg. F.), and even higher. Such a fever in amarillic (yellow fever) infection, especially if it occur after more or less decided remissions, is indicative of a grave process, and

should be accompanied by well-developed icterus, marked albuminaria and some hemorrhagic manifestation, if not black vomit. Such was not the case in our patients.

2. None of these cases had any indication of hemorrhage. One of them, Ramón García, who had persistent vomiting, even in the eleventh day of the disease, vomited at times a clear watery fluid, and at times a yellowish fluid without a speck of blood. The gums did not bleed.

3. The albumin in the urine rarely exceeded a mere trace, seldom sufficiently well marked to show any precipitate; and this only after cooling. In the case of García, before our arrival, the presence of much albumin in the urine was noted, as a result of the Esbach test. This method of testing is especially deceptive in connection with yellow fever. Soon afterwards, though the temperature of the patient was rising once more, there were found only traces of albumin by the heat and acetic acid method.

ENTIRE BUILDING COVERED WITH CANVAS

4. Icterus that might be considered suggestive of yellow fever, was present only in the case of García. Another patient, Emilio Estévez, had the slight yellowish tinge of the conjunctiva that we frequently meet with in malaria, and the third patient, Cota, presented no icterus whatever. In the case of García, the jaundice was not dissimilar from that of yellow fever, but it is accounted for by the presence of a right-sided pneumonia with tenderness over the gall bladder.

5. Bronchial symptoms. An outbreak of influenza seems to have occurred among these malarial subjects. They all coughed much with expectoration in the later stages, and García had in addition the pneumonic focus already mentioned. This was revealed by the presence of bronchial breathing and a decided dulness extending from the spine of the scapula to beyond the angle of the bone. It is interesting to note that the sputum was not rusty, thus making it still more apparent that there was no tendency to hemorrhages.

Before concluding, I wish to discuss certain symptoms that were once held in repute as diagnostic of yellow fever. I refer to the remission of temperature on the second, third or fourth day, and to the several manifestations of pain.

We can conceive of the said remission being regarded as an important sign only at a time when preventive medicine did not exact the greatest precision in diagnosis; at a time when the disease was called bilious remittent fever in some people and yellow fever in others; when yellow fever was supposed to be a disease of maritime cities and malaria a disease of the country; a time when the diagnosis was based to a great extent on the antecedents of place, of origin, nationality, etc. The sign when present in yellow fever has no value as a distinguishing feature from the malignant form of malaria. In the subtertian type of this latter infection, especially in newcomers who are having their first attack, remissions on the second or third day are the rule. The cases that we are studying are a fair example of this.

With regard to the several manifestations of pain, we find them of equal intensity as in yellow fever, in the first outbreaks of malignant subtertian malaria and in Weil's disease. Pains in the limbs, headache, loin pains or *coup de barre,* characterize these two diseases as well as variola, plague and others. The epigastric tenderness, whether superficial or deep, is almost constant in malignant malaria accompanied by persistent vomiting. We find this condition also in Weil's disease.

The promptness with which the fumigation was done in this case was due to the use of canvas. The buildings and structures to be disinfected were completely enclosed under large pieces of this material. These large pieces of canvas are handled with unusual dexterity by our disinfecting gang. Photographs, taken by Dr. Custodio, showing the method of covering the barracks at Banes prior to fumigation, are shown.

There are two advantages in this process besides that of the rapidity with which a large structure or several buildings together may be enclosed under the awning. One advantage is the absence of extensive preparations in the interior of the building. With the older process of pasting paper over cracks and openings, there was a great deal of noise and agitation within the rooms, with the consequent danger of driving out the mosquitos. The other advantage is that the partial permeability of the canvas allows the fumes to reach everywhere, without leaving air spaces in which the insects might seek refuge against the action of the sulphur gas.

ANNUAL REPORT ON YELLOW FEVER IN THE MEXICAN REPUBLIC

Dr. Eduardo Liceaga,
Mexico City.

In the report which I had the honor of presenting to this Association in its meeting held in Milwaukee last year, I stated that yellow fever had entirely disappeared from the Territory of the Mexican Republic. This was a fact, and the same favorable conditions continued along the littoral of both seas, up to August of this year, when the first case of that disease was observed, and has been repeated till, at the present moment (November 23rd, 1911), the number reached 47 cases, with 24 deaths, as shown by the table I present.

This was the report which I proposed to present, as I do every year, on the yellow fever conditions in the Mexican Republic, but on the 23rd of this month I received, through the kindness of Dr. Guiteras, Number 3, Vol. VI. of the "Bulletin of the Sanitary and Charity Department of the Cuban Republic" for the month of September of the present year, and which contains the report on that disease which has been rendered by Dr. Mario G. Lebredo, Director of the "Duque" Research Laboratory, and Special Commissioner to Merida for the study of yellow fever. In view of this report I find myself under the imperious necessity of saying a few words with respect to it.

I must first of all render a just tribute of admiration to the distinguished physician who has made such a careful and detailed study of the subject for which he was commissioned by his Government, and at the same time express my thanks, both for the kind phrases with which he refers to the sanitary authorities of Mexico, as well as for the warnings which he kindly gives to those same authorities and which have been taken into serious consideration and will continue to be so taken, as it is our purpose in Mexico to follow the suggestions of those who made such progress in the important studies which are dealt with in Dr. Lebredo's report.

I very much regret the haste with which I have to write these observations; but if I did not do so, even though in a summary manner, I would lose the only opportunity which I have to present them to the meeting of the American Public Health Association which is being held at this moment in the Capital of the Cuban Republic, and which meeting I am specially sorry to say, I cannot attend on account of some very important official duties which require my presence in Mexico City.

For these reasons I beg that the Association will take into its benevolent consideration and toleration those points in which I differ from the opinion of the distinguished physician who went to Merida.

As regards the first three cases of Feliciano Cabrera, Quirino Dolores and Margarito Mendoza, no surprise should be felt at the fact that they were not declared, precisely because, in order to ascertain whether they were yellow fever, fragments of their viscera were forwarded through the Cuban Delegate to that

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Read before the American Public Health Association, Havana, Cuba, December, 1911.

Republic, bearing in mind the unquestionable competence of Dr. Lebredo and of the other persons who make a study of yellow fever, because it has always been my intention not to fail in declaring any confirmed case, whilst at the same time I have not felt that I ought to take the risk of spreading an unjustified alarm.

So certain is what I have just said, that a person as competent as Dr. Lebredo, expresses his opinion in the following terms: "And although with only those documents relative to the autopsy, it was not possible to positively assert that the cases were of yellow fever, as on the margin of those documents it was stated, as the only clinical detail, that the disease in two cases had run eleven and twenty-one days, nevertheless I stated in conclusion that the lesions above described and referred to in the autopsy reports, authorized me to consider the cases as possibly yellow fever, and therefore dangerous from an epidemiological point of view."

If he himself, with his great experience, declared them suspicious cases how could I declare them confirmed?

As regards the two first cases of José Blanco and Rosalio Ortiz, declared to be yellow fever by the "Diagnosis Commission," the Board did not entirely support the opinion of Dr. Cazares, that they should be expunged from the list of yellow fever patients, because it is the intention that the Commission, composed of persons who have had sufficient experience in questions of yellow fever, should be the body invested with legal powers in doubtful cases, and as the declaration had already been made, the Board confirmed it and has not struck out those cases from the list of persons attacked.

Acting under the same conviction which animates Dr. Lebredo, that it is necessary to search for cases of yellow fever in those places in which it is endemic, the Sanitary authorities of Mexico have established a service such as does not exist anywhere else, as far as I know, and which consists in a system of domiciliary visits to the non-immunes. In order to carry out this purpose, the entire city is divided into districts, each one under the charge of a physician with a sufficient staff of sanitary agents, and he commences by preparing a schedule of all the non-immunes, which serves to guide the sanitary agents in making a daily visit to the homes of all those persons, for the purpose of isolating in a lazarette,—without waiting, as justly said by Dr. Lebredo, for four or five days in order to give the attending physician time to make the diagnosis of the patient—every person who may be found suffering from fever from any cause whatever. For this reason it is noted that the number of suspects who enter daily into the lazarette is very numerous.

This procedure is that which has served for eight years, to discover in Tampico, Veracruz, Progreso, Córdoba, Mérida and the entire Isthmus of Tehuantepec, the first cases of any outbreak of yellow fever. We thus see that what Dr. Lebredo calls *a search for the cases* has been our constant practise for the last eight years, and thanks to this precaution it has been possible to exterminate yellow fever along the entire coast. I do not make any mention here of the part referring to Campeche and Yucatán, because I will take this matter up later on.

The Board appointed Dr. Carlos Manuel Garcia to proceed to Merida and there make a study of the disease, and as soon as he reached that city, the practice was started of taking the temperature every morning of the soldiers of the 16th and 31st battalions of infantry, a practice which has been kept up, and as soon as any one of those soldiers or of the women who go into the barracks presented symptoms of fever, the individual was taken to the lazarette.

Dr. Lebredo asks me the following questions: "Do any special sanitary organizations exist in Merida to take charge of the feverish non-immunes and to make the diagnosis of yellow fever?"

Unfortunately, what he observed was true. The suspects were not isolated with the promptitude ordered in the instructions given by the Board of Health to the Chiefs of the Yellow Fever Service; but as soon as Dr. García took charge, the thermometer was applied every day, both morning and evening, to all the soldiers of the two battalions, wherever their duties took them, and as soon as any one of them was found feverish, he was sent to the hospital, whatever might be the cause of the symptom, and this is the dominant idea of the Board which has given rise to the instructions for the domiciliary visits by the agents of the sanitary brigades. If, unfortunately, these instructions were not carried out in Merida, it was not through any defect in the organization, but in the employees, and, as already stated, all these defects were remedied on the arrival of Dr. García. The diagnosis of the disease is not made by the physicians in charge of districts, because their only duty, according to the Regulations issued by the Board, is to apply the thermometer and as soon as the domiciliary visitor discovers a case of sickness, whether in the barracks or amongst the civil population, the patient is at once removed to the lazarette.

The fact that Dr. Lebredo did not find more than one case from the civil population in the lazarette, was not due to any failure in the *search* for cases, but to the fact that the present epidemic has spread very little outside of the two barracks. It is to be deplored that the physician who discovered a child sick with yellow fever did not make the declaration which it was his duty to make, under Art. 262 of the Sanitary Code, and I regret that Dr. Lebredo does not give his name, because that physician contributed, against the interests of the locality in which he resides, to the ignorance of the presence of yellow fever.

It is unquestionable that Dr. García must have given orders not to leave the screened doors of the lazarette open in order to facilitate the service, as that would have rendered the isolation entirely inefficient.

I have certainly given the epidemic the importance which it calls for, and efforts are being made to carry out all the measures which experience has shown us give satisfactory results in other localities, in which yellow fever has been finally stamped out.

The question of screens in the barracks, unfortunately, does not depend on the Sanitary Services, but on the War Department and the Government of Yucatán, for which reason the Board of Health could take no action in the matter, but only request the support of those authorities.

At present, all the dwellings of the men and women who frequent the barracks are under observation, and the temperature of those persons is taken every day, just as with the soldiers.

The traveling Sanitary Agents have orders to prepare a list of the passengers and hand it to the Chief of the Yellow Fever Service in order that those passengers may be kept under observation, when they are non-immunes, and that any of them who fall sick may be isolated. If the journey is longer than that from Merida to Progreso, as happens between Veracruz and Cordoba and Santa

Lucrecia, Coatzacoalcos and Salina Cruz, etc., those Sanitary Agents, as soon as they find feverish symptoms in a passenger, isolate him from mosquitoes within the railroad car itself, by covering him with a mosquito net. If he is seated, this is done by means of a hat which carries a veil that falls to his waist and which is kept in place by small leaden weights. This is, therefore, the purpose of the Board in having traveling agents on the trains.

There is no place in Veracruz set apart for quarantine like the "Triscornia" in Havana, but both in that as well as other ports, the precautions taken of applying the thermometer to all passengers arriving by sea, and if any of them shows symptoms of fever, he is placed in a screened litter, and in that is taken to the lazarette. The non-immunes who arrive and are not feverish, are questioned as to the place of their destination, and if they are to remain in Veracruz, the Sanitary Authorities watch them from day to day, as they do the local non-immunes, whilst if they go to any town in which yellow fever has at some time prevailed, the local authorities are notified, and only those whose destination is the Central Tableland of Anahuac are exempted from observation, because in that region the Stegomyia mosquito does not exist, and if any person arrives there with the disease, as has already happened, he is not in any way dangerous to the community.

With these precautions, which were adopted eight years ago, no cases of yellow fever have been observed from outside sources, because those who arrive are at once isolated in the lazarette or temporary hospital, and therefore have not become foci of epidemics.

Under this system which we have followed against yellow fever, not a single new case of the disease has been observed from the 3rd of November, 1903, and in Veracruz from the 11th of February, 1909, that is to say, during a period of two years and nine months. This shows that the sanitary services established in the Mexican Republic have been efficient on both coasts, with the present exception of Merida.

I repeat that I desire to call special attention to these points, in order that they may serve me for the observations which I will make further on.

The very interesting report rendered by Dr. Lebredo, as a physician of unquestionable competence in matters of yellow fever, gives the impression that the disease spread in Merida by reason of the arrival of the 16th and 31st battalions, and of the recruits received, more specially by the second of these battalions, from the villages in the Territory of Quintana Roo, Campeche, Veracruz, and Merida itself.

As regards the Territory of Quintana Roo, it is possible that the disease may exist there, but it has not been demonstrated. Can we suppose that during the entire period, according to Dr. Lebredo, that yellow fever has existed in Quintana Roo, it has not made itself evident except in mild cases, and has never assumed the form of an epidemic? As regards Campeche, I have to make two important observations.

I.—No epidemic had made its appearance for many years before the month of September, 1910; it has been found impossible to ascertain the cause of the outbreak, that is to say, how the disease was contracted by the Spanish woman who was the first case.

II.—The outbreak in Campeche took place precisely at the time when, for the sake of economy, the Federal Government ordered the disbanding of the Sanitary Brigade in that State.

As soon as the first case appeared, Dr. Carlos Manuel Garcia was sent to the place, but the Sanitary Brigade was reorganized under the direction of the delegate of that port, who was given all the necessary resources in the way of a staff, disinfectants, etc. The State of Yucatan was protected by means of a sanitary station where the passengers traveling on the railroad were examined daily. Dr. García left that port whilst there was still one case of yellow fever, but the service was not abandoned in his absence, as the Sanitary Brigade continued the service to the month of July of the present year. For the above reasons, with all due respect to Dr. Lebredo, I cannot accept the observations he makes with regard to Campeche.

As regards the epidemic in Merida, an interval of twenty months had elapsed between the last case observed there and the first one of those which appeared in the month of August last, and precisely because the first cases were doubtful, the viscera and clinical sheets were sent to Cuba, as stated in the beginning of this report, in order to consult the best experts in yellow fever. In this way attention was roused, not by cases demonstrated through hemorrhage and jaundice, but by cases of such a doubtful character, that Dr. Lebredo, in the first lines of his report, simply states that he is disposed to believe they were cases of yellow fever.

As I have always maintained, I also call attention to the fact that sporadic cases may pass unperceived in towns that are almost entirely immune, because if, as said by Dr. Lebredo himself, there are thousands of non-immunes in the civil population of Merida, how is it possible that during the lapse of twenty months, in the midst of numerous mild cases which pass unperceived, no serious cases should be observed, and when they are, how is it they do not come in series, as happens now in Merida? In connection with this, I desire to call attention to this important point: in the epidemics of yellow fever, as in the case of other transmissible diseases, sporadic cases may be observed; but as soon as the disease takes an epidemic form, there is an uninterrupted succession of cases, in which we can trace the transmission from one to another with intervals of more or less days. To suppose that cases may have existed during a continuous period of twenty months, and pass unperceived because they are all mild and do not give rise to apparent manifestations, is a theory entirely contrary to the teachings of the epidemiology of all diseases, and in all parts of the world. The epidemics of yellow fever in the Mexican Republic have been no exception whatever to that rule, both those which were observed before the establishment of the struggle against the disease, as well as those which have been observed in the eight consecutive years during which that struggle has been carried on in all seasons of the year. In fact, whenever an epidemic spreads, one case is followed by another and this by another and so on. This was observed in the epidemic which prevailed in Campeche during the past year, and which closed with nine cases, and if no more than these were observed, it was because the Sanitary Brigade continued its active work, as I have already said, up to the month of July of this year.

This is what has been observed in the City of Merida. The cases noted by Dr. Lebredo have been followed by a continuous series of new ones, until they reached the proportions already cited.

It is not true that a pre-existing endemic was converted into an epidemic only after the arrival of the 16th and 31st battalions, because there were thousands of resident non-immunes in Merida as well as travelers, who are constantly arriving in that city, and amongst them all no case of yellow fever was observed in a period of twenty months. If the first three cases to which Dr. Lebredo refers were not reported, it was because there was no certainty as to the diagnosis, but reported or not, they were followed by those which Dr. Lebredo himself observed in Merida, and the others which have succeeded up to the date on which I close this report.

As regards Veracruz, I must again emphatically declare that no case of yellow fever has presented itself since February 11, 1909.

I repeat here what I told the Sanitary Authorities of Cuba on the 24th of August of that year, in connection with the case of Gallo Mancilla. This Spaniard who had resided in Puebla for over two years (a city in which yellow fever has never appeared), reached Veracruz on the 12th of June, 1909. He remained there for four days and then took passage on the *Fuerst Bismarck*, which sailed on the 16th. On the 17th he showed symptoms of fever. He reached Havana and being suspected of yellow fever, he was taken to the Hospital of "Las Animas," where that suspicion was confirmed, although the case was diagnosed as mild. It has been claimed that he contracted the disease in Veracruz.

I have asked the sanitary authorities of Cuba to explain this fact, because if we claim that a mosquito could have remained infected from the 11th of February when the last case was observed, four months had elapsed, and although Dr. Guiteras has been able to preserve an infected mosquito alive for 154 days, in a bottle in the Hospital of "Las Animas," consequently the insect which stung Gallo Mancilla must have remained infected for the 120 days which elapsed from the 11th of February, how can we suppose that the insect only stung one man, and not a single one of the ten thousand non-immunes who constantly reside in Veracruz, or any of the passengers, who are continually arriving from abroad or from the Central Tableland where yellow fever does not exist? I ask why neither before nor after the 12th of June, 1909, and up to the present date, has no other case been observed in that port? Neither can I find any explanation in the supposed existence of a larval and latent form of yellow fever in the children, which would have maintained the infection without the infected mosquito having carried the disease from anyone of those children to any other person than Gallo Mancilla, either in the four months previous to the 12th of June, 1909, or during all the time that has elapsed since that date. How could it be possible in a city like Veracruz, where physicians are found who have all their lives been attending patients of this class, that a case of the disease should pass unperceived during such a long period? Dr. Lebredo very justly says that, before a case of hemorrhage arises with evident jaundice, there are many others which can only be discovered by very careful study; but is it possible that in such a long period of time a new epidemic should not have arisen and made itself evident as at present in Merida, and not only that it should pass unperceived by the local physicians, but also by the medical agents who are kept in that port by the Republic of Cuba and the United States? But neither one nor the other of those two officers, whose competence is beyond a doubt, have reported in all that period any case whatever that could have passed unperceived by the local physicians.

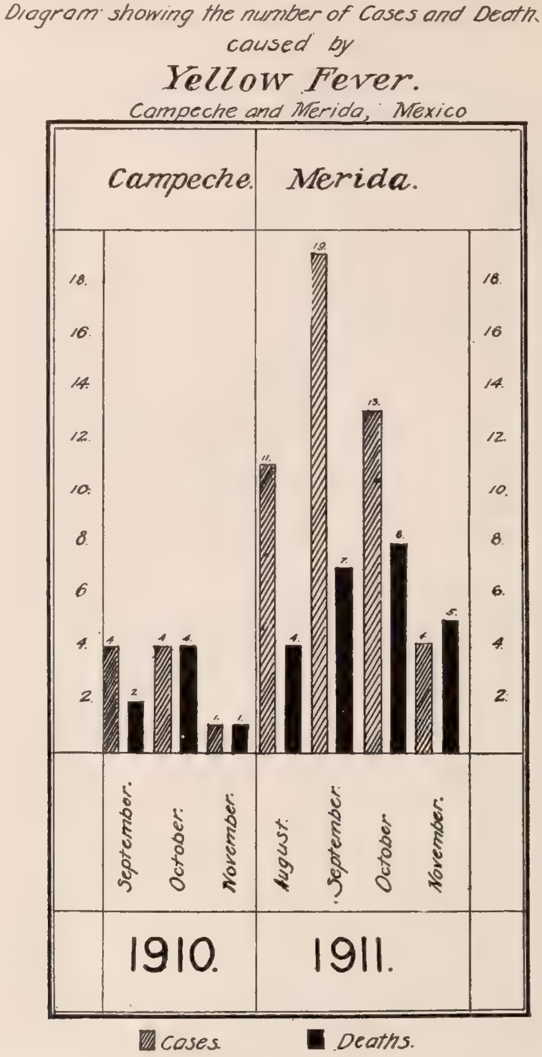

Diagram showing the number of Cases and Death caused by Yellow Fever. Campeche and Merida, Mexico

This point which I have submitted and which has not as yet been answered by the Sanitary Authorities of Cuba, is what leads me to the following conclusions:

I. That the outbreak in Merida cannot have originated in Veracruz.

II. That this case does not come within the doctrine of the transmission of yellow fever by the mosquito, in which the infection is transmitted from the yellow fever patient to the mosquito, and after a period of incubation lasting twelve days, this insect acquires the fatal property of inoculating non-immunes with the disease.

These conclusions, which I desire to submit for the consideration of this meeting, with a solemn declaration that I do not refer to these cases for the purpose of making any defense against the quarantine which has been imposed on us by the Republic of Cuba, but merely for a scientific purpose; that of clearing up doubtful points.

On behalf of the Sanitary Authorities of Mexico, I place at the disposal of the similar authorities of Cuba and the United States, the entire territory comprised in the Peninsula of Yucatan, in order that persons as competent as the Cuban and American physicians are in matters connected with yellow fever, may carry out the investigations which they think necessary. We are not dealing now with questions of mere local interest, but with those that relate to universal science and the interests of humanity, and which demand solution. The sanitary authorities of Mexico do not claim to be able to solve these problems themselves, and therefore are willing to render any assistance to the two countries above mentioned in order that investigations may be carried out which will clear up these doubtful points.

THE USE OF A MODIFIED HESSE'S MEDIUM FOR ISOLATING THE TYPHOID BACILLUS AND THE CHOLERA SPIRILLUM FROM STOOLS*

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and
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The use of differential media for the isolation of pathogenic intestinal bacteria from the feces has already been successfully applied in the detection of typhoid bacilli, but the most recent technique for the isolation of the spirillum of Asiatic cholera recommends a smear-culture on plain agar. The following brief preliminary report is made, therefore, in order to record certain observations concerning a differential color test for colonies of the typhoid and paratyphoid bacillus, and the spirillum of Asiatic cholera. This medium has been already described previously by Stokes and Hachtel[1] as a modification of Hesse's semi-solid agar, and this medium is prepared in the following manner:

The formula of the medium is as follows:

Agar (dried at 105° C. for half an hour)	5.5 gm.
Liebig's extract of beef	5 gm.
Peptone (Witte)	10 gm.
Lactose	10 gm.
Glycerin	50 gm.
Sodium chlorid	8.5 gm.
Distilled water	1,000 c. c.

Before using, the agar should be dried at 105° C. for half an hour to free it from all moisture. This medium should be kept in an ice-chest, the air of which is artificially provided with moisture.

The agar is dissolved in 500 c. c. of distilled water by heating and the loss of evaporation is made up. The beef-extract is added to the remaining 500 c. c., dissolved by heating, filtered into a sterile flask, and inoculated with the colon bacillus, and then incubated at 37° C. for twenty-four hours. This is for the purpose of reducing and removing all of the muscle-sugar from the medium, so that any organisms acting on muscle-sugar shall not confuse the reaction by producing acid colonies. The sugar-free bouillon is filtered after the incubation, and the peptone, lactose and salt are next dissolved in this fluid, and the loss of evaporation is made up by the addition of distilled water. The two solutions are then mixed and boiled for thirty minutes, the loss of weight being again made up by the further addition of distilled water. It is next filtered, the reaction corrected to a neutral reaction and the 50 c. c. of glycerin added; it is then colored with a solution of Kahlbaum's azolitmin, and 10 c. c. are placed in each test tube. It is then autoclaved at 15 pounds pressure for twenty minutes, and stored in the ice-box. It is necessary to place tightly fitting rubber caps over these tubes in order to prevent evaporation.

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*Read before the Laboratory Section, American Public Health Association, Havana, Cuba, December, 1911.

[1] Stokes and Hachtel. Archiv. of Int. Med., Vol. 6, Aug. 1910, p. 121.

When the bile culture from a typhoid suspect is received at the laboratory it is incubated for twenty-four hours, and a series of dilutions from the incubated bile is then made in the following way: One loopful of the incubated bile is transferred into a water blank, which is shaken, and one loopful from this water blank is transferred into a second water blank. A series of eight dilutions is then made in the melted Hesse medium cooled to 40° C., and the medium from each tube is then poured into a separate plate. The plates are then incubated for twenty-four hours, and if the typhoid bacillus or paratyphoid bacillus is present, the colonies will appear as medium sized, with concentric rings, and will show a distinct pink color. This color reaction enables one to distinguish between the Bacillus typhosus and the Bacillus alkaligenes. We have found this medium of great service in detecting the presence of typhoid bacilli in stools, and when suspicious colonies are obtained a small quantity is mixed with a proper dilution of an immune serum or of a positive typhoid blood. If agglutination takes place, the diagnosis is confirmed by a study of the cultural characteristics.

The previously quoted article described the detection of the typhoid bacillus by means of this medium from drinking water obtained from surface rivers and a well, from sewage, and clinical and "carrier" cases of typhoid infection; and since that time we have continued to use this medium successfully in detecting the presence of the typhoid and paratyphoid bacillus in feces, urine and blood.

We have also obtained the typhoid bacillus from a sewage-polluted stream which contained oyster-beds, and as this condition existed in a community in which two distinct outbreaks of typhoid had occurred, a brief description of the circumstances pertaining to these outbreaks will be offered.

One of these outbreaks gave a record of 35 cases of typhoid fever in a town of about 1,500 persons, many of them living in houses on the banks of the stream in which the polluted oyster-bed was situated. About the same time an outbreak occurred in a large institution partially bordering on this stream, and in a population of about 700 persons, 30 cases of typhoid fever developed. It is not known, however, whether any of the patients obtained oysters from these infected oyster-beds.

The bacteriological examination of the water and oysters from this bar gave the following result: Samples taken from the bar consisted of ten oysters, taken at a depth of 2 feet; and one bacteriological sample of water taken at a depth of 3 feet.

Oysters: The number of bacteria in one cubic centimeter of juice taken from each oyster was 1,800, 1,800, 2,100, 2,400, 2,100, 2,400, 3,000, 1,800, 2,100 and 2,400, respectively; an average of 2,190 bacteria per cubic centimeter of juice for each oyster. Presumptive tests for colon or intestinal bacteria were positive for all ten oysters, and the colon bacillus was isolated from all samples.

Water: The sample of water collected from this bar contained 1,800 bacteria per cubic centimeter. The colon bacillus was found in both one and ten cubic centimeters of the water. An examination of this water for Bacillus typhosus revealed the presence of a bacillus having all the morphological, biological and serological properties of this organism.

The typhoid colonies were recognized by their typical, large, concentrically arranged, pink appearance, and were easily distinguished from the smaller, moist, concentrated colon colonies.

It later occurred to us to test the color reaction of the various spirilla upon this same medium, and we found that the Spirillum choleræ and the Nassik spirillum could be distinguished from the bacilli of the typhoid group by the fact that these spirilla formed a blue colony on our modified medium, due to the alkaline reaction produced. These colonies appeared in twenty-four hours as large, bluish, concentric colonies, with an opaque, nucleus-like centre, and varied in diameter from 5 to 15 millimeters.

We also made a few tests with these two spirilla, using other differential media for this purpose. Smear cultures were made over Endo's medium, and after eighteen hours in the incubator the cholera spirillum appeared as small, pale, gray, translucent, moist colonies with a fine, pin-point red center, and had an average diameter of 1 millimeter. After 42 hours incubation the entire colony was pale pink in color, and had an average diameter of 2 millimeters. On microscopic examination the edges were undulate, with a narrow, decolorized, peripheral zone, which was barely apparent to the naked eye. The Nassik spirillum after 18 hours incubation on Endo's medium formed a pale, gray, translucent, moist colony resembling the typhoid colony incubated for the same length of time. After 42 hours incubation the colony resembled the 18 hour colony of the cholera spirillum.

These experiments failed to disclose anything very characteristic about the appearance of these spirilla either on our semi-fluid lactose-glycerin-litmus agar or on Endo's medium. By the use of our modified Hesse's medium the Spirillum choleræ can, of course, be differentiated from the Bacillus coli and the Bacillus typhosus by the color reaction. Other organisms such as the Bacillus alkaligenes, Bacillus proteus, Bacillus fluorescens, Bacillus fluorescens liquefaciens, and the Bacillus pyocyaneus, however, appear as blue colonies on this medium.

It next occurred to one of us that, since the cholera spirillum produces an amylolytic or starch-splitting enzyme and the colon bacillus does not, starch might prove useful in the isolation of the cholera spirillum from the stools of carriers. We then experimented with starch agar in two forms: one a 3 per cent. starch litmus agar for smear cultures, the other a semi-fluid starch-litmus agar. This latter was made according to the directions given by us in the first part of this article for Hesse's medium save that the glycerin and lactose were omitted and 10 grams of starch were added and the reaction was corrected as before so as to be neutral to phenolphthalein. The meat sugar was, of course, removed by a preliminary inoculation of the broth with the colon bacillus.

The solid medium proved a failure as the cholera colonies could not be distinguished from those of the colon bacillus, both being moist, pale blue and translucent.

When inoculated in the semifluid starch-litmus agar the Spirillum choleræ gave round, spreading colonies without concentric rings, and were pink in color. These colonies measured from 2 to 5 mm. in diameter.

The Nassik spirillum on this same medium resembled the cholera spirillum, as did also the Spirillum of Finkler-Prior and the Spirillum metchnikovi.

The typhoid bacillus gave round, spreading, pale blue colonies with the typical concentric zones. These colonies measured from 3 to 10 mm. in diameter. The colonies of the Bacillus alkaligenes resembled closely those of the Bacillus typhosus.

We have studied the appearance of both the Bacillus dysenteriæ (Shiga) and the Bacillus dysenteriæ (Harris). Both of these organisms showed small, blue surface colonies, and deep pin-point colonies of neutral reaction.

The Bacillus choleræ suis and the Bacillus enteriditis formed round, blue, spreading colonies without concentric rings; the diameter of these colonies ranged from 2 to 10 mm. The Bacillus coli and the Bacillus communior formed circular, blue, spreading colonies which varied in diameter from 2 to 10 mm.

The Bacillus proteus, the Bacillus cloacæ, and the Bacillus gasoformans presented round, spreading, blue colonies with a diameter of from 2 to 8 mm. The odor of the Bacillus proteus was distinctly sharp and ammoniacal. The Bacillus proteus fluorescens gave moist, blue, circular colonies of from 2 to 3 mm. in diameter.

The Bacillus capsulatus (Friedländer), the Bacillus lactis ærogenes, and the Bacillus acidi latici, all gave small, blue, non-spreading colonies.

The Bacillus pyocyaneus formed round, spreading, blue colonies without concentric zones; these colonies ranged in diameter from 2 to 10 mm.

The Bacillus subtilis formed very large, round, blue, spreading colonies without concentric zones.

CONCLUSIONS.

We believe that the use of semi-solid agar according to the methods described above will distinguish between the typhoid and paratyphoid bacillus and other motile intestinal organisms by means of the characteristic pink color of the former colonies. The colon bacillus is occasionally motile and resembles the typhoid colony, and these colonies can only be surely distinguished by using agglutinative typhoid serum. The use of starch instead of lactose and glycerin in the semi-solid medium produces a characteristic color reaction for the intestinal spirilla. These spirilla split up the starch and produce an acid reaction of the medium. We intend to continue our experiments, but suggest the use of these semi-solid media at this time as a step towards securing characteristic color tests for colonies of the intestinal pathogenic organisms.

THE HYGIENE OF THE SWIMMING POOL

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The hygiene of swimming pools is a very interesting question, and one of prime importance, because it is recognized that the swimming pool which is not kept in good sanitary condition may develop into a source of danger instead of being a place for beneficial and healthful recreation. The purpose of the experiments described in this paper was to ascertain the general sanitary condition of the swimming pools at the University of Wisconsin, and to determine the increase in pollution of the water through use.

Experimental work commenced in January, 1910, at the suggestion of Dr. M. P. Ravenel, Director of the State Hygienic Laboratory, and consisted of bacteriological and chemical analyses. Samples for analysis were taken daily from each pool and at times twice a day, *i. e.*, morning and afternoon. The bacteriological examinations included counts of the bacteria per c.c. growing on gelatin at 20 deg. C. and on litmus lactose agar at 37 deg. C., and presumptive and confirmatory tests for B. coli. The chemical analyses included determinations of chlorine, of nitrogen as free ammonia, albuminoid ammonia, nitrites and nitrates, and were made for the purpose of detecting the increase of these elements during the week, and further to ascertain the relative delicacy of each as an index of the pollution of the pool. The methods followed in these examinations and analyses were those prescribed by the Committee on Standard Methods of Water Analysis of the American Public Health Association.

There are two swimming pools at the University of Wisconsin, one for men and one for women, located in their respective gymnasia. The pool in the men's gymnasium is eighty feet long, twenty feet wide, four feet deep at one end and ten feet at the other, giving a total capacity of approximately 97,000 gallons. The floor and walls are of white tile. The tank is emptied, cleaned and filled with lake water once a week, the water remaining in the pool for five days. The temperature of the water is maintained at 70 deg. F. Approximately 275 men use the tank daily, and on Saturdays a considerably larger number. Before entering the pool each man is required to take a thorough shower bath, during which most of the superficial dirt is washed off and a considerable amount of pollution thus prevented.

The women's pool is sixty feet long, twenty feet wide, three and one-half feet deep at one end, and seven feet deep at the other, having a total capacity of approximately 70,000 gallons. The water is pumped from Lake Mendota and is filtered before passing into the pool. The two filters, which are of the pressure type, using coke and scrap iron as the filtering material, were installed for the purpose of removing vegetable growths which at times imparted a very disagreeable odor to the water, especially after the water remained in the tank for a few days. The pool is emptied and the floor and walls thoroughly scrubbed each Saturday, and the tank allowed to air until the following Monday, when it is

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Read before the Laboratory Section, American Public Health Association, Havana, Cuba, December, 1911.

filled. Bathing is not permitted until the next morning. The water is kept at a temperature of 75 deg.-80 deg. F. During the four days that the pool is open about 200 women use it, an average of about fifty persons per day. The regulation relative to bathers taking shower baths before entering the pool is also in force at the women's gymnasium.

In order to determine the general sanitary condition of the pools experiments extending over several weeks were made. For the sake of briefness, all the data are not given here, but the results are representative. Bacteriological and chemical analyses of samples taken from the men's tank were made in January, March, and April, 1910, and in January and February, 1911, and of samples collected at the women's pool during the same months of 1911.

In the first series of experiments, conducted in January, 1910, two samples were collected daily, morning and afternoon. Plating and inoculation of fermentation tubes was done as soon as the samples reached the Hygienic Laboratory, within fifteen to thirty minutes after collection. A sample was always taken from the supply pipe while the water was flowing into the pool and analyzed in order to ascertain its initial quality, and for comparative purposes.

The tabulated data for the first series of experiments from January 18 to January 29, 1910, inclusive, are given in table 1.

TABLE I.

BACTERIOLOGICAL EXAMINATIONS OF WATER FROM MEN'S SWIMMING POOL.

	Gelatine count per c. c. 20° C	Litmus, lactose Agar count per c. c. 37° C	B. coli present in .1cc 1cc 10cc	Chlorine p. p. m.
Pipe sample 1-18-10 4 P.M.	150	5	— — +	1.4
Tank " 1-19-10 10 A.M.	455	349	— — +	1.4
" " 1-19-10 4 P.M.	5100	920	— — +	1.5
" " 1-20-10 10 A.M.	29600	3600	— — +	1.4
" " 1-20-10 4 P.M.	14800	1350	— — —	1.4
" " 1-21-10 10 A.M.	1400	440	— — +	1.6
" " 1-21-10 4 P.M.	540	440	— — +	1.8
" " 1-22-10 10 A.M.	620	220	— — +	2.1
" " 1-22-10 4 P.M.	1260	575	— — +	2.1
Pipe sample 1-24-10 4 P.M.	30	18	— — +	1.1
Tank " 1-25-10 10 A.M.	163	420	— — +	1.1
" " 1-26-10 10 A.M.	1470	500	— — +	1.1
" " 1-26-10 4 P.M.	21970	660	— — +	1.2
" " 1-27-10 10 A.M.	16900	1550	— — +	1.2
" " 1-27-10 4 P.M.	9700		— + +	1.2
" " 1-28-10 10 A.M.	1280	240	— + —	1.2
" " 1-28-10 4 P.M.	380	270	— — +	1.3
" " 1-29-10 10 A.M.	590	128	— — —	1.8
" " 1-29-10 4 P.M.	1560	405	— + +	2.0

The results show a gradual increase in the number of bacteria growing on gelatine. The maximum was reached about the middle of the week, followed by a decrease until Saturday, when an increase was apparent. The fluctuations in the counts on litmus lactose agar at 37 deg. C. were similar to those on gelatine; an increase took place during the first days of the week, then a decrease following a maximum, which was reached after approximately forty-eight hours. Saturday afternoons the number of bathers is generally large, and this probably accounts for the increase noted at the end of the week. Bacillus coli is usually present in ten c. c. and sometimes in one c. c. of the lake water. During the two weeks B. coli was generally present in ten c. c. and only occasionally in one c. c. of pool water. Only a slight increase in the chlorine content was apparent; in fact, throughout the entire series of experiments the chlorine showed very little increase.

In Table No. 2, bacteriological and chemical results for the week of January 16, 1911, are tabulated. The gelatine and litmus lactose agar counts manifest similar fluctuations to those given in Table No. 1. B. coli was generally present

TABLE 2.

BACTERIOLOGICAL EXAMINATIONS OF WATER FROM MEN'S SWIMMING POOL.

	Gelatine count per c. c 20° C	Litmus Lactose Agar count per c. c. 37° C	B. coli present in .1cc 1cc 10cc	Chlorine in p. p. m
Pipe sample 1-16-11 4 P.M.	440	5	— — +	1.0
Tank “ 1-17-11 10 A.M.	1200	910	— — —	
“ “ 1-17-11 4 P.M.	14000	770	— + +	1.2
“ “ 1-18-11 10 A.M.	22500	2250	— — +	
“ “ 1-18-11 4 P.M.	13500	3010	— + +	1.1
“ “ 1-19-11 10 A.M.	8600	1900	+ — +	
“ “ 1-19-11 4 P.M.	10700	1900	— — +	1.2
“ “ 1-20-11 10 A.M.	3050	1410	— — +	
“ “ 1-20-11 4 P.M.	4500	900	— — +	1.6
“ “ 1-21-11 10 A.M.	620	120	— — —	
“ “ 1-21-11 4 P.M.	1600	538	— — +	2.0

CHEMICAL ANALYSES OF THE SAME.

	N as Free NH_3	N as Alb. NH_3	N as NO_2	N as NO_3	Total	Chlorine in p. p. m
Pipe sample 1-16-11 4 P.M.	0.118	0.274	0.003	0.02	0.415	0.8
Tank “ 1-17-11 10 A.M.	0.156	0.276	0.005	0.03	0.467	1.4
“ “ 1-18-11 10 A.M.	0.176	0.380	0.007	0.03	0.593	1.7
“ “ 1-19-11 10 A.M.	0.180	0.400	0.012	0.025	0.617	2.2
“ “ 1-20-11 10 A.M.	0.250	0.380	0.025	0.03	0.685	2.1
“ “ 1-21-11 10 A.M.	0.220	0.420	0.022	0.03	0.692	2.8

in ten c. c. and only occasionally in one c. c. The chemical data show a small but gradual increase in free ammonia, albuminoid ammonia, nitrites, and, of course, total nitrogen resulting from the addition of nitrogen in these forms. The amount of nitrogen as nitrates remained quite constant, while the chlorine increased slightly.

In general the chemical results show the presence of considerable nitrogenous organic material in the lake water and the initial increases in the number of bacteria per c. c. on gelatine and agar were without doubt the result of the natural growth of the bacteria in a favorable environment, and were not caused by the addition of polluting material. As B. coli is usually present in ten c. c. of the lake water its confirmation generally in ten c. c., but only occasionally in one c. c., of pool water cannot be considered as the result of contamination. From the data in tables Nos. 1 and 2, and additional results not given in this paper, it appears that the hygienic condition of the men's swimming pool is generally good.

Table No. 3 shows the bacteriological and chemical results after one liter of urine had been added to the water in the pool in order to determine whether or not any material increase in the nitrogen and chlorine content would be manifest

TABLE 3.

EXAMINATIONS OF WATER FROM MEN'S SWIMMING POOL AFTER ONE LITER OF URINE HAD BEEN ADDED.

BACTERIOLOGICAL.

	Counts on Gelatine per c.c. 20° C	Count on Litmus Lactose agar per c.c. 37° C	Gas in Dextrose Broth .1cc 1cc 10cc.	B. Coli present in .1cc 1cc 10cc.
Pipe sample 2- 6-11 11 A.M.	425	17	— — +	— — +
Tank " 2- 7-11 11 A.M.	9000	130	— + +	— + +
" " 2- 8-11 11 A.M.	45000	1770	— + +	— + +
" " 2- 9-11 11 A.M.	15000	105	+ + +	+ + +
" " 2-10-11 11 A.M.	9000	47	+ + +	+ + +
" " 2-11-11 11 A.M.	5000	258	— + +	— + +

CHEMICAL.

	N as Free NH_3	N as Alb. NH_3	N as NO_2	N as NO_3	Total	Chlorine in p. p. m.
Pipe sample 2- 6-11 11 A.M.	0.070	0.230	0.002	0.05	0.352	2.1
Tank " 2- 7-11 11 A.M.	0.090	0.240	0.003	0.03	0.363	1.7
" " 2- 8-11 11 A.M.	0.120	0.180	0.009	0.04	0.349	3.0
" " 2- 9-11 11 A.M.	0.160	0.220	0.011	0.04	0.431	2.0
" " 2-10-11 11 A.M.	0.190	0.160	0.012	0.03	0.392	3.2
" " 2-11-11 11 A.M.	0.250	0.310	0.016	0.02	0.596	1.7

in the daily analyses. The urine was added Monday afternoon, February 6th, after a sample had been taken at the pipe. The maximum count on gelatine was relatively quite high and the counts remained high during the week. The agar counts were somewhat low, but B. coli was constantly present in ten c. c., one c. c., and occasionally in one-tenth of a c. c. Its continued appearance in one c. c. was significant in this series, because it was usually absent from one c. c. of the pool water in most of the experiments. There is no essential difference between the results of the chemical analyses of this series and those shown in Table No. 2. In general, the chemical results showed that nitrogen determinations were more delicate than chlorine determinations as an index of the sanitary condition of the pools.

TABLE 4.

BACTERIOLOGICAL EXAMINATIONS OF WATER FROM MEN'S SWIMMING POOL.

	Counts on Gelatine per c.c. 20° C	Count on Litmus Lactose agar per c.c. 37° C	Gas in Dextrose Broth 1cc	Gas in Dextrose Broth 10cc	B. Coli present in 1cc	B. Coli present in 10cc
Pipe sample 3-28-10 11 A.M.	275	16	+	+	+	+
Tank " 3-29-10 11 A.M.	445	480	+	+	+	+
" " 3-29-10 3:30	920	483	+	+	+	+
" " 3-30-10 11 A.M.	5630	680	+	+	+	+
" " 3-30-10 3:30	19100	1140	+	+	+	+
" " 3-31-10 11 A.M.	24000	1190	—	+	—	+
" " 3-31-10 3:30	10000	1080	—	+	—	+
" " 4- 1-10 11 A.M.	1700	690	—	+	—	+
" " 4- 1-10 3:30	2570	780	—	+	—	+
" " 4- 2-10 10:30	2800	560	+	+	+	+

Same samples treated with .5 part and 1 part available chlorine respectively for 30 minutes.

	Count on Gelatine per c.c. 20° c		Count on Litmus Lactose agar per c.c. 37° C		B. coli present in			
	.5 part av. cl.	1 part av. cl.	.5 part av. cl.	1 part av. cl.	1cc .5 part av. cl.	10cc .5 part av. cl.	1cc 1 part av. cl.	10cc 1 part av. cl.
Pipe sample 3-28-10..	0	0	1	0	—	—	—	—
Tank " 3-29-10..	4	0	5	0	—	—	—	—
" " 3-29-10..	8	0	8	0	—	+	—	—
" " 3-30-10..	4	0	2	2	—	—	—	—
" " 3-30-10..	30	0	45	1	—	—	—	—
" " 3-31-10..	130	5	120	1	—	—	—	—
" " 3-31-10..	14	0	27	1	—	—	—	—
" " 4- 1-10..	15	0	9	0	—	+	—	—
" " 4- 1-10..	12	0	30	1	—	—	—	—
" " 4- 2-10..	27	0	66	0	—	+	—	—

The results of a series of experiments made for the purpose of determining the amount of available chlorine in parts per million necessary to produce practically a sterile water are given in Table No. 4. Two hundred and fifty c. c. samples of water taken from the men's swimming pool were treated with hypochlorite of lime in the proportion of five-tenths of a part and one part of available chlorine per million for thirty minutes. The bacteria content of the samples was materially reduced and B. coli generally destroyed when five-tenths of a part of available chlorine was used; one part of available chlorine produced, for practical purposes, sterility, and completely destroyed B. coli.

In order to demonstrate in a practical way the efficiency of calcium hypochlorite as a disinfectant, a solution of "bleach" was made up and its strength in terms of available chlorine ascertained. This solution was poured into the swimming pool which had been in use by the students for three days, during which period there was a considerable increase in the bacterial content of the water as shown by examination. The amount of hypochlorite solution added resulted in a concentration of 0.41 gram of "available chlorine" per million parts of the water. The results are tabulated below:

Date 11/11/11	Gel. Count per c. c. at 20°	Per cent decrease	Litmus Lactose Agar Count per c. c. at 37° C.	Per Cent Decrease	Colon Present in		
					.1 c. c.	1 c. c.	10 c. c.
Before addition	4,000		3,600		—	—	+
½ hr. after	600	85%	400	89%	—	—	+
24 hrs. after	650	84%	500	86%	—	—	+
48 hrs. after	730	82%	590	84%	—	—	+

These results show that 0.41 parts per million effected a very satisfactory reduction of the number of bacteria, and indicate clearly the practical value of calcium hypochlorite as a disinfectant. It is reasonable to presume, in view of the results given in table 4, that one application per week of calcium hypochlorite to the swimming pool water in the ratio of one part of available chlorine per million, would preserve the pool in excellent sanitary condition.

Bacteriological and chemical data of some of the experiments on samples taken from the women's swimming pool are given in Tables 5 and 6. The counts on litmus lactose agar remained uniformly low; the number of bacteria growing on gelatine followed a curve of fluctuation somewhat similar to the curve suggested by the counts shown in Tables 1 and 2, while B. coli was generally absent from ten c. c. The chemical data substantiate in a general way the bacteriological findings.

These results indicate that the hygienic condition of the women's swimming pool is entirely satisfactory and that the method of filtration employed yields a desirable degree of purification.

TABLE 5.

EXAMINATIONS OF WATER FROM WOMEN'S SWIMMING POOL.

BACTERIOLOGICAL.

	Counts on Gelatine per c.c. 20° C	Count on Litmus Lactose agar per c.c. 37° C	Gas in Dextrose Broth			B. Coli Present in		
			.1cc	1cc	10cc	.1cc	1cc	10cc
Pipe sample 1-23-11 4 P.M.	260	10	—	—	+	—	—	+
Tank “ 1-23-11 4 P.M.	570	35	—	—	+	—	—	+
“ “ 1-24-11 11 A.M.	1680	46	—	—	+	—	—	+
“ “ 1-25-11 11 A.M.	2300	47	—	—	+	—	—	—
“ “ 1-26-11 11 A.M.	2200	30	—	—	+	—	—	—
“ “ 1-27-11 11 A.M.	4250	29	—	—	—	—	—	—

CHEMICAL.

	N as Free NH_3	N as Alb. NH_3	N as NO_2	N as NO_3	Total	Chlorine in p.p.m.
Pipe sample 1-23-11 4 P.M.	0.128	0.328	0.002	0.01	0.468	1.6
Tank “ 1-23-11 11 A.M.	0.020	0.310	0.010	0.04	0.380	2.2
“ “ 1-24-11 11 A.M.	0.045	0.300	0.010	0.06	0.415	1.5
“ “ 1-25-11 11 A.M.	0.060	0.460	0.011	0.05	0.581	3.2
“ “ 1-26-11 11 A.M.	0.140	0.580	0.016	0.05	0.786	3.3
“ “ 1-27-11 11 A.M.	0.080	0.330	0.018	0.07	0.498	2.4

TABLE 6.

EXAMINATIONS OF WATER FROM WOMEN'S SWIMMING POOL.

BACTERIOLOGICAL.

	Counts on Gelatine per c.c. 20° C	Count on Litmus Lactose agar per c.c. 37° C	Gas in Dextrose Broth			B. Coli Present in		
			.1cc	1cc	10cc	.1cc	1cc	10cc
Pipe sample 2- 6-11 11 A.M.	425	17	—	—	+	—	—	+
Tank “ 2- 6-11 11 A.M.	4400	48	—	—	—	—	—	—
“ “ 2- 7-11 11 A.M.	4250	34	—	—	—	—	—	—
“ “ 2- 8-11 11 A.M.	4600	123	—	—	—	—	—	—
“ “ 2- 9-11 11 A.M.	2100	10	—	—	+	—	—	—
“ “ 2-10-11 11 A.M.	2750	6	—	—	+	—	—	+

CHEMICAL.

	N as Free NH_3	N as Alb. NH_3	N as NO_2	N as NO_3	Total	Chlorine in p.p.m.
Pipe sample 2- 6-11 11 A.M.	0.070	0.230	0.002	0.05	0.352	2.1
Tank “ 2- 6-11 11 A.M.	0.005	0.290	0.006	0.10	0.401	2.8
“ “ 2- 7-11 11 A.M.	0.010	0.300	0.007	0.08	0.397	1.7
“ “ 2- 8-11 11 A.M.	0.010	0.260	0.006	0.06	0.336	1.9
“ “ 2- 9-11 11 A.M.	0.005	0.280	0.007	0.07	0.362	2.1
“ “ 2-10-11 11 A.M.	0.100	0.160	0.007	0.08	0.347	2.2

CONCLUSIONS.

The results of the series of experiments indicate that the pools at the University of Wisconsin are kept in good sanitary condition, and that there is little danger of transmission of disease.

The application of hypochlorite of lime affords an efficient method of disinfection and when used in the ratio of five-tenths part of available chlorine to 1,000,000 parts of lake water a practically sterile water results. This method of disinfection offers an excellent means of insuring a hygienic swimming pool.

REPORT OF COMMITTEE ON EDUCATION OF THE PUBLIC AS TO THE COMMUNICABILITY AND PREVENTION OF GONORRHOEA AND SYPHILIS

At the meeting of the American Public Health Association, held at Milwaukee in September, 1910, your Comittee presented a Report and the following Recommendations, which were adopted:

1. The Committee recommend the recognition, study and control of the prevalence of gonorrhœa and syphilis, as with all other communicable diseases, in order to ascertain the distribution of the diseases.

2. An educational campaign for parents of all social classes and children of all ages and sexes. This teaching should be not only moral, but also medical in the widest sense. It will not do at present to rely on the moral argument.

(a) Proper distribution of circulars, pamphlets, and other literature by state health departments through all suitable channels.

(b) State health departments to instruct all of its local health officers in sexual matters and direct them to make a systematic effort to educate the people in their respective communities.

(c) State health departments to make a definite and determined effort to awaken and interest the medical profession in this fight against venereal diseases.

(d) State health departments to send out especially trained paid teachers and lecturers of their own, supported by exhibits and lantern slides, to address special meetings of parents, health officers, medical men, teachers and others in schools, colleges, churches, etc., on these and other preventable diseases.

(e) State health departments to encourage the organization of local leagues or associations whose purposes shall be the support of and control of a crusade against the spread of all communicable diseases.

1. Said societies to include every profession and walk of life.
2. To depend upon philanthropists for necessary funds rather than upon subscriptions for financial support.

(f) Health departments to interest and provide instruction in sexual matters for students of the upper grades.

1. By introduction of biology into the graded courses of all schools.
2. By introduction into the textbooks on physiology of upper grades, instructions in reference to anatomy and physiology of the urinary and sexual organs.
3. By special instructions to normal school students who are to become the instructors.
4. To impress upon the presidents, deans, preceptors and teachers of those subjects the necessity of repeated instructions in reference to the communicability of syphilis and gonorrhœa and to inculcate a morale of protection among the student body.

Presented to the American Public Health Association, Havana, Cuba, December, 1911.

(g) To utilize health departments for the proper occasional presentation of the subject and to discourage the display of advertising matter which encourages the exposure to dangers in these diseases.

(h) To utilize church clubs, fraternal societies, trade unions, women's clubs, and especially mothers' clubs for instruction of parents.

(i) Health departments to recommend the enactment of laws for:

1. Physical inspection and segregation of prostitutes.
2. Notification and report (by number, if desired) of venereal cases.
3. Physical examination of men before marriage; and that male applicants for marriage licenses be required, in order to obtain the same, to submit to examination by a duly qualified physician to determine if they are free from venereal diseases.
4. Keeping open free night dispensaries and maintenance of special dispensaries and hospitals for those diseases.
5. Making it a crime knowingly to spread venereal disease.

(j) Advocacy of temperance on account of the relationship between alcoholism and venereal diseases.

(k) Advocacy of personal cleanliness and venereal prophylaxis.

(l) Advocacy of early marriages.

In order to bring the Report and Recommendations to the attention of the State Boards of Health, the Chairman of the Committee mailed reprints to the respective Secretaries with the inquiry how far they would be willing to endorse the recommendations of the Committee and secure remedial action.

In answer to the inquiry, eight replies have been received:

Dr. Henry D. Holton, of Vermont, "cordially endorses all the recommendations made in the report."

A Bill will be presented at the next meeting of the Vermont Legislature which provides that "the term infectious, contagious or communicable disease dangerous to public health shall include chancre, chancroids, gonorrhœa, syphilis or other venereal diseases."*

Dr. William F. Snow, of California, writes:—

"In my judgment the report is most excellent in its presentation of the subject and in the carefully considered recommendations. . . .

"I believe that under the division ("i") that notification and report should be given first importance and that physical inspection and segregation of prostitutes should perhaps follow item No. 5. . . .

"I think that you know our State Legislature took action last March endorsing the ruling of the State Board that venereal diseases must be reportable."

Dr. Swarts, of Rhode Island, writes:—

"As at the meeting when the report was submitted I am ready to endorse all the recommendations except physical inspection and segregation, inasmuch as I believe that experience shows that results are not obtained except to a slight extent where military supervision might be enforced."

Dr. C. O. Probst, of Ohio, writes:—

"While I believe in compulsory notification, I do not believe that our physicians or the public would back up the enforcement of such a law. Our Board would doubtless favor the second and third recommendation and has already taken some action to carry out the fourth recommendation." . . .

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*(For full draft of bill see "Social Diseases," October, 1910).

Dr. Calvin S. White, of Oregon, writes:—

"I have carefully examined the report . . . and want to heartily endorse everything that you have said; particularly your recommendation as to it being a campaign of education. The only possible exception that I could take to the matter is the prevalence of venereal diseases. My own experience and observation of others on this Coast leads me to believe that there are not so many affected men as are usually given in statistics. However, this is merely a matter of opinion and you may put me on record as heartily endorsing the recommendations."

Dr. H. M. Bracken, of Minnesota, writes:—

"I am not ready to express an opinion at present," and requests that copies of the Report be mailed to all the Members of his Board.

Dr. S. J. Crumbine, of Kansas, writes:—

"I will say that in a general way I am in entire accord with the recommendations of the Committee, but in this state I have already been blocked in an attempted educational campaign by the State Printer refusing to print our pamphlets on Sex Hygiene, which we had intended for wide distribution through the medium of our travelling Tuberculosis Exhibit.

"I fear it would be a long time, judging from the present indifference of the lay community, before it will be possible for this Department to carry out all the recommendations of the Committee relating to State Health Departments.

"If you have any suggestions to make as to how this indifference may be overcome and how the Legislature might be made to see the necessity for making appropriations for carrying on the work outlined by the Committee, and whether or not your association would assist this Department in securing such legislation, in our 1913 Legislature, I will be glad to have you advise me."

Dr. William C. Woodward, of the District of Columbia, writes:—

"1. The first recommendation I endorse.

"2. The second recommendation, in so far as it calls for 'an educational campaign for parents of all social classes and children of all ages and sexes,' should be worded so as to make it clear that it is not intended to recommend that children of all ages and of both sexes be instructed as to the communicability and prevention of gonorrhœa and syphilis. If this recommendation is intended to mean—and I have no doubt that such is the case—that children of all ages and of both sexes should be instructed with respect to the biology of reproduction, in a manner suitable to their respective ages and sexes, I am heartily in accord with the Committees' recommendations.

"Under the second recommendation, paragraph (e), sub-paragraph 2, it is recommended that state health departments encourage the organization of local leagues or associations, whose purpose shall be the support and control of a crusade against the spread of all communicable diseases, to depend upon philanthropists for necessary funds rather than upon subscriptions for financial support. It is not clear whether it is meant that in connection with this work state health departments should depend upon philanthropists or that the proposed leagues or associations should depend upon philanthropists for such support, although the obscurity is, I think, due rather to the form in which the recommendation is printed than to any great uncertainty as to the meaning of the Committee. Personally, I believe that the Government should provide the funds necessary for the work of the health departments, even if such work is the encouragement of the organization of local leagues and associations for the purposes named. It might be proper for such leagues or associations to depend upon philanthropists for necessary funds, but the distinction between depending, on the one hand, 'upon philanthropists for necessary funds,' and, on the other hand, 'upon subscriptions for financial support,' is not clear.

"Under Section 2, moreover, paragraph (I), sub-paragraph 1, it is recommended that health departments urge the enactment of laws for the physical inspection and segregation of prostitutes. Unless this includes both male and female prostitutes, I am not ready to subscribe to it. It may be urged that it is more difficult to inspect and segregate male prostitutes than female prostitutes, but under an American system of government, I doubt very much if this is the case. The female prostitute who cannot pass inspection simply plies her vocation clandestinely. In any event, in so far as relates to both male and female, some definition should be given of the word 'prostitute.' The man or woman who indulges in promiscuous sexual intercourse is, in my judgment, none the less a prostitute because he or she may have other means of support than is the regular inhabitant of a house of prostitution.

"Under Section 2, furthermore, paragraph (i), sub-paragraph 5, it is recommended that the health department recommend the enactment of laws making it a crime knowingly to spread venereal diseases. This recommendation, in my judgment, to be susceptible of execution should provide for the enactment of laws making it a crime for anyone who has been duly informed that he has syphilis or gonorrhœa, and who has not been advised by competent medical authority that he is cured of that disease to have sexual intercourse without taking due precautions to prevent the communication of the malady from which he is suffering or to do any other act liable to spread infection.

"From the foregoing statement, as you can readily see, I am in the main in hearty accord with the Committee's recommendations, but I do not feel that I can go on record as endorsing them without the limitation set forth above."

It is to be regretted that criticisms and comments have not been more numerous, and it is hoped that this is not indicative of official apathy to a class of communicable diseases, which constitute a greater peril to society than all acute infectious diseases combined.

On the whole, we believe that gratifying progress has been made during the past few years in the campaign for the prevention of so-called vice diseases.

In addition to the steps taken by California, the health department of the City of New York has officially decided to place the venereal diseases—Syphilis and Gonorrhœa—upon its index of infectious and communicable diseases, and ask, not demand, that all such cases be reported to it by the medical profession. The Department has further appealed to the City Board of Assessments and Apportionment for means for the erection of a pavilion for the care of venereal patients and this appeal is backed up by the Medical Society of the County of New York (see "Social Diseases," July, 1911).

The Committee in its report expressed the belief that the main remedy lies in public education which should be carried on along the same lines which is making the work of local societies and the National Association for the study and prevention of tuberculosis so effective. It is gratifying that commendable progress has been made in this direction.

The movement in this country, according to Prince A. Morrow[1], started by the organization in New York City of the American Society of Sanitary and Moral Prophylaxis in February, 1905.

The educational work of this society has been attempted in three directions: 1st. By public meetings and conferences; 2nd. by lectures and publications. Among the excellent pamphlets issued by this Society may be mentioned the following: 1st. The Young Man's Problem. 2nd. Education in the Physiology and Hygiene of Sex for Teachers. 3rd. The Relations of Social Diseases with Marriage. 4th. The Boy Problem. 5th. How My Uncle, the Doctor, Instructed Me in Matters of Sex. 6th. Health and the Hygiene of Sex for College Students. 7th. Sex Instruction for Little Girls (in preparation). 8th. Unprotected Young Women (in preparation).

In addition the Society has also distributed several thousands of reprints from "Charities and Commons," a symposium on the Treatment of Venereal Diseases; a symposium on Blindness of the Newborn—and a leaflet on the Origin of this Movement, its objects, aims and methods of work. Over 225 lectures have been delivered under the auspices of the Society.

"Social Diseases," a quarterly journal for the report of the progress of this movement, has been published by the New York Society since January, 1910, and, according to Dr. Morrow, it is expected that it will soon become a monthly publication.

Similar Societies have been formed in the following States: *Pennsylvania,* founded March 26, 1906. Membership in June, 1909, 1,004; 25,000 of a circular of Information for Women were distributed largely among the employees of the department stores and factories of Philadelphia and vicinity. Public meetings in Philadelphia and in various cities of the State were held.

The *Indiana Society* was organized in June, 1907. Over 30,000 copies of a general educational pamphlet have been distributed by the State Board of Health. The lecture work has been done chiefly by Professor Woods of the Medical Department of the State University and by Dr. Hurty of the State Board of Health in different parts of the State.

The *Maryland Society* was organized in 1908 under the auspices of the Medical and Chirurgical Faculty. A large number of Educational pamphlets have been distributed by the Society through the genito-urinary departments of the dispensaries and other channels. The Society employs a field secretary to give instruction to small groups of mothers and girls, and lectures have been given before Men's Clubs, Mother's Clubs, church societies, social settlements, etc.

The *California Society* was organized April 19, 1909, and has accomplished very effective educational and legislative work. The first pamphlet on the "Great Red Plague" was published in the Official Bulletin of the State Board of Health. Dr. Francis M. Greene, a tactful and fearless speaker, is President, and Dr. David Starr Jordan of the Leland Stanford, Jr., University, is Vice-president of the Society: both are very effective men, and have secured many excellent co-workers.

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[1] We are indebted to Dr. Morrow and Dr. Folkmar for much of the information contained in this report concerning the various state and city organizations and their activities.

Similar organizations have been formed in the State of West Virginia, Connecticut, Michigan, and are in process of formation in Rhode Island, New Jersey and Virginia. A number of State Boards of Health like Cailfornia, Indiana, Rhode Island, Ohio, Massachusetts, Vermont, Washington, have issued educational leaflets. One of the recent California Bulletins contains reference to the subject of early marriages and to the subject of asexualization.

Societies have also been organized in Chicago (1906), Milwaukee (1906), Portland (1907), Spokane (1908), St. Louis (1909), Denver, Jacksonville, and more recently in the City of Mexico, Syracuse, Buffalo, and other cities.

Most of the societies are educational in their activities, by means of lectures and circulars. The Spokane society has secured the co-operation of the Board of Education and "the most successful work of the year has been made possible in the meetings for parents conducted by the Society in the various school buildings. . . The newspapers of the cities have favored us with increasing publicity. The principal of the school has announcements made to the pupils . . . of the meeting that they may remind their parents. . . . The principal also furnishes the Society with a list of the parents . . . and the Society mails a letter to each parent. Through the efforts of the Society, the question of sex education has been brought before the State Board of Education of Washington and is being considered by that body." (From the Second Annual Report of the Spokane Society.)

"The American Federation for Sex Hygiene" was organized in St. Louis, June, 1910, at a meeting of delegates from eleven of the societies of different states. Former President Eliot of Harvard is the Honorary President. There are now eighteen societies represented in the Federation. This is to be an endowed society. (For further particulars see "Social Diseases," July, 1911.) The social aspect of venereal diseases has received more attention in medical and general periodicals during the last year than ever before. Mr. Samuel Hopkins Adams in the Journal of the American Public Health Association, November, 1911, discusses the subject in his usual vigorous and intelligent style and says: "That the atmosphere is clearing, there can fortunately be no doubt. A speaker may deal frankly with sex hygiene to-day, on platforms from which he would have been angrily driven a few years ago. Newspapers which have been virtuously indignant at the mere mentioning 'private diseases' (except in quack advertisements, heavily paid for) will now print more or less guardedly the warnings of medical officialdom."

According to Merck's Archives (November, 1911), the Ohio Senate unanimously passed Senator McDonald's Bill providing for the physical examination of males contemplating matrimony.

We believe that Dr. Morrow is entirely within the bounds of reason when he declares: "It may be confidently stated that indications point unmistakably to one immediate result of the campaign of education, viz., the limitation of venereal infections in marriage. It is abundantly evident from numerous letters and personal communications with physicians in various parts of the country that a sense of the danger and criminality of marrying with an uncured venereal disease has begun to penetrate the consciousness of the laity, and that more and more men contemplating matrimony consult their physicians as to their physical fitness for marriage and parentage."

In our report last year we state that it was a lamentable fact that the United States and Great Britain, two typical Anglo-Saxon nations, should lead all other armies and navies in the prevalence of venereal diseases, and attributed this undue prevalence largely, if not entirely, to the fact that the sentiment in these two countries, both in and out of the profession, is strongly against recognizing the evil, and therefore had not been made a subject of popular education. As a result of criminal ignorance and neglect the admission rate for this class of diseases in the U. S. Services was ten times greater than in countries where serious attention has been paid to the consideration of the problem.

It is gratifying to report upon the authority of the Surgeon General, U. S. Army, that the propaganda for the prevention of venereal diseases in the Army which was initiated by his office in January, 1909, has begun to show good results as indicated by a reduction in the admission rate from 196.99 in 1909 to 174.95 in 1910 for the entire army, and a reduction from 177.46 in 1909 to 155.51 for the army in the United States proper.

The results in the United States Navy are indicated in the following letter from Surgeon General C. F. Stokes:—

"The curve of the admission rate for the primary venereal diseases (syphilis, chancroid and gonorrhœa), since 1900, show a constant rise from 52 per 1,000 in that year, to 108 per 1,000 in 1906. In the next year it fell to 85, the cause thereof not being apparent.

"The years 1907-8-9-10 exhibit a rapid rise which, in a large measure, was undoubtedly more apparent than real, due to instructions requiring the recording of all cases and to the more frequent physical examination of the personnel.

"The maximum 164 was reached in 1910, the returns for the first six months of this year showing a reduction in the annual rate to 147. This reduction is regarded as an actual one, and not to a failure to report cases inasmuch as it is accompanied by a corresponding fall in the admission for the sequelæ and complications of venereal disease.

"The reduction is almost entirely due to a lessened rate for gonorrhœa, that of syphilis and chancroid remaining practically constant.

"It is hoped that the establishment of the technic planned for adoption by this bureau will show a pronounced fall in the incidence of venereal diseases in the future.

"Lack of uniformity of procedure, personal indifference and prejudice account for the failure to secure more promising results. Prophylaxis has semi-official recognition only, and therefore is not at present under satisfactory control."

Respectfully submitted,

Geo. M. Kober,
Chairman.

Chart showing the rate per 1000 of cases of venereal diseases in the Army and Navy. The rate for 1911 is based on reports for the first six months only.

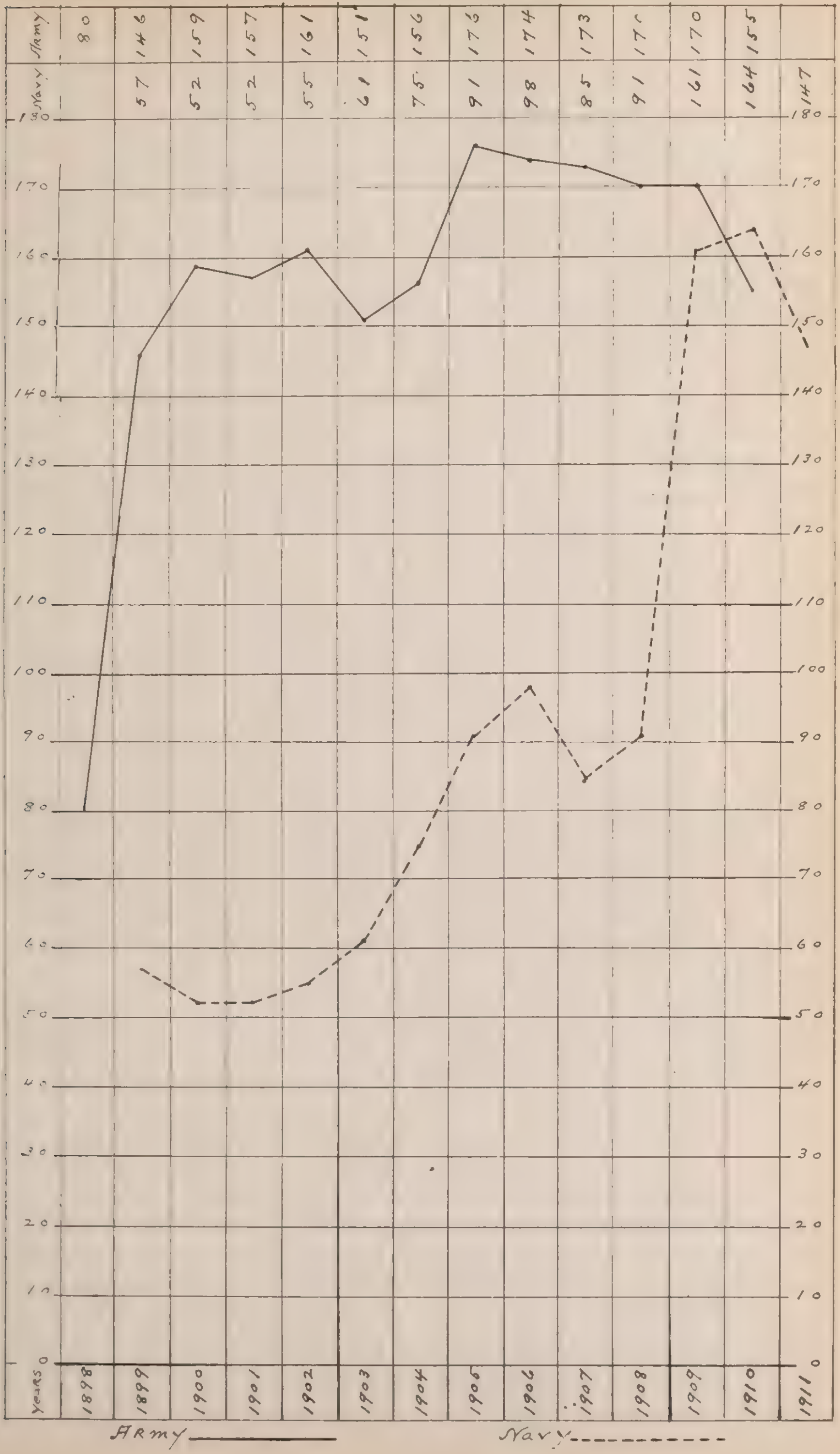

TABLE SHOWING ADMISSION RATE PER 1,000 FOR VENEREAL DISEASE IN THE U. S. NAVY.

Disease	1909	1910	1911*
Gonorrhoea	105	107	91
Chancroid	28	35	29
Syphilis	27	23	27
	160	165	147
Admissions for Sequelae	28	32	27

*Annual rate based upon six months' returns.

Discussion.

Dr. Schenck:

Some twelve months ago I was forced to take active steps in the improvement of conditions resulting from venereal diseases in Norfolk—not only in the protection and conservation of the health of our people, but to protect and foster our business and commercial interests. The recruiting and training station of the U. S. Navy Yard, situated at Norfolk, sends large numbers of men to our city, sometimes several thousand. They are a class of men who, when granted shore leave, as they regularly are, take in all of the various and sundry sports of which our city abounds, and, like all other seaport cities, we have a somewhat densely populated "segregated district." We were given to understand by the naval authorities that too many of their enlisted men were being infected with venereal troubles, and if we wished to have them ashore we must do something to prevent this. Our merchants, of course, profit quite largely from the patronage of the sailors, and our business interests demanded that we protect them as far as it lay in our power, so, after several conferences with the Commandant of the Naval Stations, I decided to inaugurate inspection and surveillance of these women to that end.

I appointed four physicians and one officer. The physicians were empowered to make regular inspection of all women in Norfolk engaged in public prostitution. The physician practising here were requested to give to the Department of Health a confidential report of their cases of gonorrhœa and syphilis, and where the case was contracted. The proprietor or proprietress of all houses of assignation and prostitution are required to notify the Health Department of the arrival or departure of all inmates within twenty-four hours of the arrival or departure, as the case may be, and are warned and required, under penalty not to permit any person to ply her vocation until she shall have been examined by one of the physicians and granted her card. This card does not state that the woman is free from venereal disease, not at all, but simply states over the signature of the examining physician that the holder of the card (giving her name, age and description) has complied with the requirements of the Department of Health of Norfolk.

When we find an inmate infected we isolate and quarantine her or take her to the hospital for treatment. If she or the landlady violates any of the rules or requirements of the Department of Health, we arrest and fine her.

When we started in this work there was some 268 cases of venereal disease among the recruits at the stations mentioned, and while these men are coming and going all the time, I think the station before our inspection, etc., averaged about two hundred cases at all times. These have steadily decreased, notwithstanding shore leave is regularly granted this large number of men, until now we only have some fifteen or sixteen cases at the stations. The Navy Department there are delighted with results and are actively co-operating with us. From reports given me by many physicians whom I have interrogated along this line, I find also that the number of cases of venereal diseases in their practice is steadily decreasing. We find that the system of inspection and surveillance not only is productive of good results by the immense reduction of venereal diseases, but by this method of regular examination of a very careless class of people we detect other diseases—infectious skin diseases and particularly tuberculosis. We have sent several of the women to the Catawba State Tuberculosis Camp, several home to their parents, and by this method of requiring an immediate report by the landlady of the arrival of new inmates we have been enabled to reclaim some of them who had not before been an inmate of a house of prostitution and sent them home. I believe the work to be a good one. It has many phases and ramifications—is far reaching in its effects and will, if persistently and conscientiously carried out, do great and lasting good.

Dr. Dowling:

In the State of Louisiana during the last fifteen months this subject has been discussed publicly in 256 towns, and we have endeavored to keep the ravages of these diseases constant before the people. We have urged fathers to teach their boys and mothers to teach their daughters that they might escape from the bad effects frequently resultant from immorality. On numbers of occasions we have appealed to teachers to co-operate to the extent of instructing the boys and girls, by taking them apart when they have reasons to believe their students have not been properly taught, and tell them in chaste, dignified language the benefits derived from leading clean, moral lives.

We fully appreciate the importance of teaching the children the dangers of Gonorrhœa and Syphilis.

Dr. Snow:

This is one of the most important subjects before the American Public Health Association, and one I believe should be brought continually before the public. There are many men in the medical profession everywhere when this subject is brought up that take an attitude of secrecy. This attitude must in some way be broken down before much can be accomplished in an administrative way. The California State Board of Health has gone on record before the public to the effect that these diseases are similar to other communicable diseases and must be reported. A law making the reporting of these diseases mandatory was passed by the last Legislature, but it is provided that cases may be reported by office number. The City of Sacramento is now proceeding, exactly as in other communicable diseases, to investigate and isolate cases reported. Other California cities are beginning to do the same. This applies to male cases as well as to women. In time the loyalty of the people will give us a thoroughly good control of all of the active and clandestine prostitutes. There should be a public clinic where venereal diseases are treated just as we now have tuberculosis clinics open to all persons who choose to state that they are indigent. These clinics should be open for advice, and also to men and women who would like to be cured of these diseases, if necessary, without giving their name and address. To my mind, an institution established in this way would be of special value in aiding us to reach the large number who are the prey of unscrupulous and dishonest druggists and "free consultation experts."

Dr. Mohr:

One phrase of the report on which I profess ignorance as to methods of bettering this particular part and I would like information. I have heard it stated that children of all ages should be instructed on these subjects. When it comes to the question of how to reach school children and how is this delicate subject to be treated so as not to further stimulate a morbid curiosity, I can easily understand how to reach the older children, boys of 15, one can easily reach them and possibly the girls, but when it is said children of all ages should be instructed along these lines I must confess I am at a loss. If any one can kindly specify the method by which this information can be given, I will certainly be very much obliged.

Dr. Woodward:

I do not understand that the Committee recommends that children of all ages be given the same instruction about this subject. What can with advantage be taught children of different ages, and methods of approach suitable for different ages, can be learned by studying the literature that has been published for the laity concerning it. Not that all such literature is good or even fit for the purpose for which it was printed, but that the professional reader can utilize so much of it as his professional judgment and his good sense tell him is available for his use upon any particular occasion.

Dr. Snow:

I should like to ask Dr. Guiteras to inform us what is being done here in Havana to control syphilis and gonococcus infection, and whether segregation as practiced is considered a satisfactory measure.

Dr. Guiteras:

I have never looked into this subject very carefully. The registration of prostitutes is enforced in Havana. The funds derived from the inscription are employed in the administration and policing of this department, and in the inspection and care of the infected. There is a special Commissioner in charge of these funds and there is a surplus of several thousand dollars. Some of our authorities maintain that the plan is successful, and that most of the venereal infection is the result of clandestine prostitution. Whether the reglementation does not promote the clandestine practice, and what the effect of the whole system may be on moral conditions, I am unable to say. I consider the problem a very difficult one.

REPORT OF COMMITTEE ON NECROLOGY, 1911 AMERICAN PUBLIC HEALTH ASSOCIATION

DR. H. D. HOLTON, Chairman.

Leonard Parker Kinnicutt

LEONARD PARKER KINNICUTT became a member of this Association in 1899. Prof. Wm. T. Sedgwick, who has been associated with our distinguished fellow member, writes as follows: "Science, education and the State have each and all suffered a heavy loss in the death of Professor Leonard Parker Kinnicutt, head of the department of chemistry in the Worcester Polytechnic Institute. The passing of a prominent politician or of a millionaire often excites more comment than does the death of a quiet yet accomplished worker in the fields of science and education, and it seems to me therefore fitting that the citizens of Massachusetts should pause for a moment to recognize and mourn the loss of one who has done high and helpful service in the fields of science and scholarship.

Professor Kinnicutt's specialty was sanitary chemistry, a subject somewhat encroached upon but by no means eclipsed by the modern development of sanitary biology, and in the subject to which he had chiefly devoted his life, Dr. Kinnicutt had made himself a leader of the very first importance.

Born in Worcester in 1854 he was graduated from the course in chemistry at the Massachusetts Institute of Technology in 1875. The next four years he spent in professional studies in Germany, and during this period had the first warning of the insidious disease from which he has finally died. The writer made his acquaintance at the Johns Hopkins University in '79, where the young Kinnicutt was a pupil of Remsen. Proceeding to Harvard, the difficult degree of doctor of science was won in 1882, and here also Dr. Kinnicutt served as instructor in chemistry until made assistant professor at the Worcester Polytechnic Institute. Since 1888 he had been director of the large and important department of chemistry in the Worcester institution, where he had long been a favorite and beloved teacher whose pupils are scattered all over the country in positions requiring responsibility as well as technical skill.

Professor Kinnicutt's principal work has been done in and for the State of Massachusetts. In 1883, for example, he was admitted to membership in the American Academy of Arts and Sciences, which carries upon its rolls the leading scientific men of Massachusetts, and from 1902 to the present time he has served as chairman of one of its most important committees. He has had much to do with the New England Water Works Association, the Boston Society of Civil Engineers and the New England section of the American Chemical Society, of which section he has taken his turn as president. His name, however, is almost as well known throughout the whole United States as it is in Massachusetts, as is shown by the fact that he has been since 1903 consulting chemist to the State

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Presented to the American Public Health Association, Havana, Cuba, December, 1911.

Sewerage Commission of Connecticut; has served as vice-president of the American Association for the Advancement of Science, and as associate editor of the Journal for Industrial and Engineering Chemistry. Moreover, unlike many well-known American scientific men, Professor Kinnicutt had an excellent international reputation with membership in the London Chemical Society and in the Chemical Society of Germany, and honorary membership in the Society of Managers of Sewage Disposal Works in England. He was an authority on the disposal of wastes; on the sanitation of air, water and gas; on methods of chemical analysis, and on many other branches of the huge and important subject of chemistry which he had made so much his own. His latest work, prepared in conjunction with Winslow of the Institute of Technology and Pratt of the State Board of Health of Ohio, is the latest and by far the best treatise on the subject of sewage disposal in the English language, and one which bids fair to remain a lasting monument. Shortly before his death he was chosen president of the Section of Hygiene and Sanitation of the International Congress of Applied Chemistry.

I can hardly trust myself to speak of Professor Kinnicutt's personality. This was unique, lovable and altogether charming. Kindness and friendship such as his life exemplified could not further go. He was critical, yet just; fearless, yet considerate of others; honest to a fault; a hard worker; and to a degree nowadays unusual, an accomplished and cultivated gentleman."

Uranus Owen Brackett Wingate, M. D.

URANUS OWEN BRACKETT WINGATE, M. D., became a member of this Association, 1890. He was for several years Health Commissioner of Milwaukee, and for ten years, Secretary of the Wisconsin State Board of Health; he died at his home in Milwaukee, February 19, 1911, from pneumonia, aged 62. He was born in Rochester, N. H.; enlisted in the army at the age of 16 and served throughout the Civil War. He attended three courses of lectures at Harvard Medical School, and Dartmouth Medical School, graduating from the latter institution in 1875. He practiced until 1886 in Haverhill and Wellesley, Mass., and served for five years as a member of the Medical Corps of the Massachusetts Volunteer Militia. In 1886, he moved to Milwaukee, four years later was made Health Commissioner of that city, and in 1894 was appointed Secretary of the Wisconsin State Board of Health. He was a member of the American Medical Association, the American Public Health Association, American Psychological Association, and the Milwaukee County Medical Society, of which he was once President. He was professor of diseases of the nervous system and hygiene in the Wisconsin College of Physicians and Surgeons; visiting neurologist to St. Mary's and Milwaukee County Hospitals, and consulting neurologist to St. Joseph's Hospital. He contributed many articles to medical literature on subjects connected with his specialties.

James A. Burroughs, M. D.

JAMES A. BURROUGHS, M. D., was born in Hookersville, West Virginia, December 8, 1857. He died in Asheville N. C., December 29, 1909. Dr. Burroughs graduated from the Louisville Medical College in 1882. Became a member of this Association in 1885. In the early eighties he had repeated attacks of pulmonary hemorrhages. A year was spent in Colorado in 1883. He sought relief in the mountains of Western North Carolina, locating in Asheville. Here he improved in health and as a result of the benefit he received in this salubrious climate, he specialized in pulmonary diseases, and persons similarly affected sought relief in this mountainous region, many returning to their homes apparently cured. In 1883 he married Miss Annie E. Reynolds. Much of his success in his busy life was accomplished aided by her untiring helpfulness. He was a member of various Medical and Sanitary Societies, and the founder and President of the Tri-State Medical Association of the Carolinas and Virginias.

Willis W. Ranshaw, M. D.

WILLIS W. RANSHAW, M. D., was born in Covington, Ky., August 4, 1871, died January 18, 1911. Became a member of this Association, 1908. Dr. Ranshaw graduated from the Miami Medical College and was Assistant Physician for two years in a private Ophthalmic Hospital in Cincinnati. He was unmarried. He organized the Sanitary Department of Covington and equipped it with modern methods and appliances. His indefatigabe devotion to duty produced organic disease of the heart, which ultimately caused his death. He practised his profession in Christian faithfulness.

William Bailey, M. D.

WILLIAM BAILEY, M. D. became a member of this Association in 1879. He was one of the oldest practitioners of Louisville and President of the Kentucky State Board of Health since 1909. He died at his home in Louisville, July 15, 1911, aged 78. He was born in Bridgeport, Ky., and was graduated from the Kentucky Medical Institute near Frankfort as B. A. in 1853, and a year later the honorary degree of M. A. was conferred on him. For three years he acted as a professor of Kentucky School of Medicine from 1857 and seven years later had conferred on him the degree of M. D., by the University of Louisville. He practised in Shelbyville, Ky., until the opening of the Civil War, throughout which he served as major and surgeon with the Ninth Kentucky Volunteer Cavalry. His college work commenced in 1869. He occupied successfully chairs in the Kentucky School of Medicine, the Hospital School of Medicine, of the faculty of which he was President, and at the time of his death was the professor of materia medica and therapeutics in the University of Louisville. He was a member of the American Medical Association, President of the American Public Health Association in 1894, President of the State Medical Society and many other local Societies, of which he was a member. He was a member of the State Board of Health of Kentucky for twenty-six years and its President at the time of his death. He was also a member of the Local Board of Pension Examiners for many years. His illness commenced in December last, when he fell and sustained a fracture of the humerus. Soon after, he had a cerebral hemorrhage. He improved but a malignant growth of the mouth developed, which caused his death. Although honored by his professional confreres in every possible manner, Dr. Bailey was a man of very modest disposition; he was clean in his profession and pure in his life, was devoted to his family and beloved by all who knew him.

Herbert Milton Nash, M. D.

HERBERT MILTON NASH, M. D., a graduate of University of Virginia, 1852. He died April 20, 1911, aged 79 years. He was Corps Surgeon in the Confederate Service in the Civil War, charter member of Norfolk Medical Society, President several years of the Virginia State Medical Society. He became a member of this Association in 1878.

Mrs. Ellen H. Richards

MRS. ELLEN H. RICHARDS became a member of this Association in 1888. She was born in Dunstable, Massachusetts, December 3, 1842. She graduated from Vassar College in 1870, with the degree A. B., received A. M. in 1873 and S. B. from the Massachusetts Institute Technology the same year. She married Robert H. Richards, Professor in the Massachusetts Institute of Technology. She was instructor from 1884 to the time of her death. She was the author of many books on Foods, Right Living, Water Analysis, and Sanitation. A modest woman whom to know was an inspiration to a better life.

A. N. Bell, M. D.

A. N. BELL, M. D., one of the original founders of this Association, born August 3, 1820, in Northampton County, Virginia, died October 16, 1911, aged 91 years. A graduate from the Jefferson Medical College, Philadelphia. He received the honorary degree of A. M. from Trinity College, Hartford, Conn., in 1860. He served as Past-Assistant Surgeon in the Navy from '47 to '55 and was the first to use steam as a disinfectant in yellow fever. An active member of Quarantine conventions, Chairman of Committee on External Hygiene, which reported a system of quarantine regulations upon which the foundation of all subsequent regulations has been based. Dr. Bell was Superintendent of floating hospital for yellow fever in New York Harbor, 1861 and 1862, was the author of Quarantine Laws passed in 1863, Supervising Commander of Quarantine, New York, 1870-3, and Inspector of Quarantine, National Board of Health, 1879. During these years he had charge of efforts to exterminate yellow fever in New Orleans and Memphis. He was founder, editor and publisher of the *Sanitarian*, 1873 to 1904; member of many Medical and Sanitary Societies, both in this country and abroad, and was a voluminous writer on sanitary subjects. As a man he was a good friend, an interesting conversationalist and an indefatigable worker.

J. P. Harrel, M. D.

J. P. HARREL, M. D., became a member in 1909. He was born in Milton, Iowa, and graduated in 1892 from the Keokuk Medical College. He commenced to practise in Clayton, and subsequently removed to Burlington, where he died June 28, 1910.

Richard M. Wyckoff, M. D.

RICHARD M. WYCKOFF, M. D., became a member of this Association in 1894. Born in Brooklyn, seventy-three years ago, Dr. Wyckoff received his early education there. Later he entered Amherst College, from which he was graduated in 1859 and from Bellevue Hospital Medical College five years later. After the Civil War Dr. Wyckoff received a commission as assistant surgeon in the

United States Navy, remaining for several years, and was then retired at his own request. Shortly afterward he want back to his home town, where he took up the practise of his profession, and had been actively engaged since. Dr. Wyckoff was at one time Registrar of Vital Statistics, Assistant Sanitary Superintendent for Brooklyn, Secretary and Deputy Commissioner of the Department of Health and Deputy Commissioner of Health. For a time he served in St. Peter's Hospital. He was a member of the Kings County Society and editor of its publication, also contributing to other medical publications.

G. M. Cantrell, M. D.

G. M. CANTRELL, M. D.,, of Little Rock, Arkansas, was born in Nashville, Tenn., died July 21, 1910, in Denver, Colorado, where he had gone hoping to regain his failing health. His father was a prominent physician of Little Rock for many years. Dr. Cantrell was educated at the Kentucky Military Institute—took his medical degree from the Vanderbilt University, married Mrs. Corrinne B. Colton, of Georgia, moving to Little Rock in 1886. He soon took a prominent position in the Professional and Civic life of the city, was a member of the City Council, City Physician, subsequently Physician to Arkansas State Penitentiary, also was President of the State Board of Health, was Vice-President and Professor in the College of Physicians and Surgeons of that city. He became a member of this Association in 1902.

James M. Morgan, M. D.

JAMES M. MORGAN, M. D., became a member of the Association in 1905. He was born in 1858 and died in Augusta, Georgia, on April 23, 1911. He was for many years President of the Board of Health of Augusta, and his administration of this high and important trust was distinguished by high professional skill and a display of unusual enthusiasm, industry and ability. He was a professor in his alma mater, the Medical College of the University of Georgia.

Walter Wyman, M. D.

SURGEON-GENERAL WALTER WYMAN died November 21, 1911. An obituary notice appeared in the JOURNAL, December, 1911.

BOOK REVIEWS

Microbiology for Agricultural and Domestic Students. *Edited by Charles E. Marshall. Philadelphia, P. Blakiston's Sons Co.,* 1911.

The appearance of this work marks a new and worthy departure in the method of compilation of text-books for purposes of technical education. For here is fully emphasized, in a unique manner, the academic viewpoint that recognizes the necessity and value of as broad a presentation as possible of the whole science of which the specialty forms only a part.

Leaving out of consideration translations of more ambitious foreign publications, this volume easily outranks, in the English language, anything of its sort with which the reviewer is acquainted. And the raggedness so frequently observed in collaborative writings has been overcome in a remarkably successful manner, giving to the work a smoothness of design and expression of subject matter that makes it attractive in the highest degree.

Bearing in mind the old Biblical saying, that "none is perfect; no, not one," attention may be called to certain points upon which there might be based some legitimate criticism.

There are, of course, the inevitable misprints here and there that, despite the finest-meshed sieve of the proofreader, have slipped through unobserved.

But one outstanding error in uniformity that should be corrected in a forthcoming edition is the very general omission in many of the divisional chapters of either a list of chief works of consultation or direct bibliographic references to some at least of the more important issues treated of. One should not undervalue, in spite of the plea of added bulkiness, the immense stimulus and satisfaction coming to the reader from the insertion of such references; they constitute an educational factor in the training of the student that acts as an incentive to the cultivation of a proper scholarly inquisitiveness.

Certain omissions strike the eye in some places. In speaking upon the "germicidal action of milk" (p. 322) the writer has ignored in this connection, the very interesting observations of Rosenau and McCoy upon the presence of certain agglutinins in milk that may go far to explain this so-called germicidal action; and also the confirmatory report of Heinemann and Glenn.

Discussing pasteurization of milk (p. 320), conspicuous by its absence stands out any reference to the experiments of Ayers and Johnson, in which it is shown that in commercial pasteurization of milk lactic acid organisms actually survive the process, and such milk does not "putrefy" but goes on to normal souring.

In the section on animal diseases no mention is made of the occurrence of "milk sickness" in stock and its cause, although papers bearing upon its appearance and cause have been given wide prominence recently.

Absurdities of composition and statement are found here and there, as for instance (p. 333), speaking of the recognition of bacterial forms in milk smears: "With sufficient experience one can recognize streptococci, B. subtilis, organisms of the B. coli type, and some of the putrefactive species. . . . The weakness of this method lies in the fact that it is not always possible to recognize the above types of organisms." Then why recommend it? And, referring to infectious diseases of unknown origin (p. 522), the use of the term "symbiosis" is not by any means allowable, if we accept as correct (and rightly so) the definition as given on page 181. And if "symbiotic relationship of infectious organisms is probably not the logical explanation for infections of this character" then why mention it?

On page 546, paragraph two, and on page 547, last paragraph, we find repeated in all its vigor that ancient statement of the value (!) as barriers against the entrance of bacteria to the nasal passages and conjunctival sac of the relatively few bristly hairs in and about those wide-open regions.

On account of loose composition one must infer (p. 609, paragraph four) that avian diphtheria has the same common causative factor as human diphtheria.

In the last paragraph, page 621, B. cholerae suis is erroneously included in the Pasteurelloses.

Referring to the means of communication of plague (p. 626, paragraph four) the writer reverses the usually accepted order of importance of the flea in relation to the infected rat and the infected human.

Probably the printer's devil is responsible for the novel conception of "dirt-carrying micro-organisms," to be found on page 547, line five from the bottom.

One cannot help noticing the plasticity of our mother tongue in such eccentric usages as "is lacked" (p. viii., introduction, line fourteen from foot), "monographed" (p. 605, line nine from foot), and "infectee" (p. 692, line eighteen from foot).

Despite shortcomings, one cannot but appreciate the great labor involved in the production of the book and admire the success attained in presenting so clearly the main facts in so relatively small a compass. Both editor and collaborators are to be congratulated upon their efforts.

The volume is neatly bound, and well set up and illustrated.

NORMAN MACL. HARRIS.

The University of Chicago.

A Text-Book of Meat Hygiene. With Special Consideration of Ante-Mortem and Post-Mortem Inspection of Food-Producing Animals. *By Richard Edelmann, Ph.D., Medical Counsellor; Royal State Veterinarian of Saxony; Professor at the Royal Veterinary High School in Dresden. Authorized Translation Revised for America, by John R. Mohler, A.M., V.M.D., Chief, Pathological Division, U. S. Bureau of Animal Industry, and Adolph Eichhorn, D.V.S., Senior Bacteriologist, Pathological Division, U. S. Bureau of Animal Industry. Octavo, 392 pages, with* 152 *illustrations; and* 5 *colored plates. Cloth,* $4.50, *net. Lea & Febiger, Publishers, Philadelphia and New York,* 1911.

Edelmann's book occupies a distinct niche in the structure which houses the sanitary sciences. The translation is clear and well englished. The book is, in fact, more than a mere translation, for Mohler and Eichhorn have added the American laws and regulations of the Bureau of Animal Industry, Department of Agriculture, and have also added illuminating data from their large experience. A greater variety of infections are transmitted to man through meat than any other single food-stuff, and next to milk, meat is responsible for more sickness and death than any other single article of food. Fortunately much of the danger is neutralized by cooking, canning, pickling, smoking and other methods of preservation. The importance of meat to the public health is recognized by all enlightened governments. In this respect the United States takes a high rank, for in 1906 an act was passed providing for the inspection of all meat entering interstate commerce; and for the purpose of obtaining a more satisfactory and safe meat supply for the people, a continuing appropriation of three million dollars is appropriated yearly. This sum is sufficient to cover the country with a corps of trained inspectors armed with ample power. The book before us deals mainly with the problems of meat inspection, but as the main object of meat inspection is protection of the public health, the volume is not inappropriately called "Meat Hygiene." Throughout the book the practical needs of the inspectors of meat have been borne in mind by the translators. Chapter I. deals with food animals, their classification and methods of slaughter. A description of the muscles and organs used for food, including beef, veal, mutton, goat meat, pork, horse meat, dog, rabbit, poultry, and meat of game, as well as fish, crustaceans, mollusks, and amphibia are discussed in chapter II. Modern methods such as the precipitin tests for distinguishing fraudulent substitutions, and the recognition of meat from different species is fully described. The various methods of production, preparation and conservation of meat are considered. In chapter IV. the regulations governing meat inspection of the United States Department of Agriculture are inserted bodily. These regulations are in themselves an authoritative text book upon the subject. The chapter upon abnormal conditions and diseases of food-producing animals is a condensed statement of the pathologic anatomy of the lesions with which every meat inspector should be familiar. Chapter VIII. deals with the infectious diseases of food animals transmissible to man, and a chapter has been added upon meat poisoning, in which proper emphasis has been placed upon micro-organisms belonging to the group of the *Bacillus enteriditis.* In this chapter we should like to find more concerning paratyphoid and the method by which these infections get into the meat, and their effects upon man. There is much to commend and little to criticise in the book. It is well printed upon good paper and handsomely illustrated. The volume will serve as a convenient and authoritative guide to inspectors, as well as an admirable text book and work of reference for students and veterinarians.

M. J. ROSENAU.

PUBLIC HEALTH NOTES

Health Activities of the American Association for Labor Legislation

Since its organization six years ago as the American section of the International Association for Labor Legislation, the American Association has given special attention to the subject of industrial hygiene. Under its auspices the First National Conference on Industrial Hygiene ever held in the United States was brought together in Chicago in June, 1909. One of the outgrowths of this Conference was the creation of the Illinois Commission on Industrial Diseases, and its valuable report on lead poisoning and other industrial poisonings resulting from industries carried on in the State. Encouraged by the example of European governments in prohibiting the manufacture of white or yellow (poisonous) phosphorus matches, the Association caused a bill to be introduced in Congress to accomplish the same result in the United States through a prohibitive tax. The Esch Bill, in which form this proposal has been before two successive Congresses, gave place recently to the Hughes Bill, an almost identical statute, which on March 5th was favorably reported by the Ways and Means Committee and has good prospect of becoming a law.

Another activity of the Association has been the promotion of bills requiring physicians to report industrial diseases, a requirement unknown in the United States until last year. Six States have now passed such laws, and there is good prospect that their example will be followed generally throughout the United States. Within a few months after the New York law took effect over one hundred cases of death from industrial poisonings had been reported to the New York Department of Labor. Sixty of these were cases of death through lead poisoning alone. To bring to bear on the problem of industrial hygiene the expert intelligence needed to effect real reform, the New York Association for Labor Legislation, a branch of the American Association, has organized a Committee on Industrial Diseases made up of representative New York physicians, sanitarians, chemists, actuaries and students of labor legislation. This committee has prepared record cards for the reporting of industrial diseases, a leaflet proposing an exact nomenclature of occupations and the diseases resulting from them, and other useful material, which is being published and widely distributed through the Department of Labor. With the co-operation of this committee, the American Association is arranging a program for a second National Conference on Industrial Hygiene, which will be held at Atlantic City on June 3d, 4th and 5th.

HENRY R. SEAGER,
President American Association for Labor Legislation.

Health Motion Pictures

"Motion Pictures Dealing with Health Subjects" is the title of a new pamphlet which the National Association for the Study and Prevention of Tuberculosis has just prepared. The pamphlet describes eleven films, each of which deals with some phase of the health problem. "The Red Cross Seal" and "The Awakening of John Bond" deal with tuberculosis and its prevention; "The Man who Learned," with the dangers of impure milk; "The Fly Pest," with the house fly; "The Wedding Bell," with the danger from sweatshop goods; "A Sane Fourth of July," with the "old-fashioned" and "new" method of celebrating Independence Day; "The Little Cripple," with conditions that produce juvenile deformity; "At the Threshold of Life," with the need for kindergartens; "The Visiting Nurse," with the work of a nursing association; "Summer Babies," with the care and neglect of babies in hot weather; and "Boil Your Water," with diseases that may come from impure water.

The circular gives, besides an outline of each picture, the price at which it may be obtained, and where, and also the manner in which the films may be rented, with a list of licensed exchanges. Copies of the pamphlet may be had upon request from the American Journal of Public Health, 289 Fourth Avenue, New York.

A Home Hospital Plan

What promises to be a most interesting and valuable experiment in home treatment of tuberculosis has been inaugurated by the

New York Association for Improving the Condition of the Poor. The Association has leased for three years a section of the East River Homes, and in these model apartments will house twenty-three families, in which one or more members are consumptives, every facility for strict sanitary and hygienic supervision being provided. The experiment is being designated as a "Home Hospital for Tuberculosis."

The objects of the plan are threefold: (1) To prevent the spread of tuberculosis from the sick to the well members of the family and particularly to protect the children from infection; (2) to cure as many as possible of those in the early stages; (3) to afford considerable improvement to persons whose cases are only moderately advanced.

Of the twenty-three families selected for the experiment, two families each have two tuberculous patients; two each have three patients, and nineteen each have one patient. In all there are twenty-two adults and seven children who have tuberculosis. Only those families will be allowed to remain who co-operate willingly in the plan. Every precaution that is provided in a well regulated hospital or sanatorium will be attempted at the Home Hospital. Advanced cases will be segregated and will be rigidly supervised so that they do not further infect other members of the family. Facilities for outdoor treatment for incipient cases will be provided on the roof, overlooking John Jay Park and the East River. An open air school on the roof will also be established for children of school age in the twenty-three families.

The resident staff will consist of a supervising nurse, who will have full control of the home; another nurse; a housekeeper and cook; a visiting housewife to instruct the families in household economics, and other helpers and assistants. The entire work will be carried on under strict and careful medical supervision.

It is estimated that the cost of the experiment will be $23,480 a year net, and excluding the possible earnings of the able-bodied members of the families. This includes not only relief, but also all medical care and oversight.

This experiment is different from that which the New York Charity Organization Society tried four years ago and abandoned because it was not successful, in that the present plan contemplates both continuous supervision of patients and sanitary, especially adapted housing conditions.

An Epidemic of "Septic Sore Throat"

Septic sore throat, a peculiar and virulent type of tonsilitis, has made its appearance in this country in epidemic proportions. The disease, which is characterized by deep abscesses and serious complications of a septic nature—such as rheumatism, pericarditis, erysipelas, peritonitis and pneumonia—is well recognized in England, and epidemics of it have been frequently traced there to infected milk supplies. An epidemic of some 1400 cases occurring in eastern Massachusetts in May, 1911, has been investigated and reported by Professor C.-E. A. Winslow. This epidemic apparently marks the appearance of a new problem for American health officers.

In the Massachusetts outbreak approximately 1000 of the cases centered around Boston, were clearly localized to certain well-to-do districts, and to the customers of a single dealer. The epidemic was of the explosive nature characteristic of those borne by milk. The remaining 400 cases occurred in Hudson, Marlboro and Southboro, adjacent towns about twenty-five miles out of Boston, were prosodemic in character, and antedated the Boston cases. A large part of the milk distributed by the dealer in question was produced in Southboro, and the evidence is strong that the earlier rural epidemic gave rise to the later urban one. The vehicle of disease in this case was a milk supply thoroughly and scientifically inspected and controlled, and it is difficult to see how the epidemic, resulting in forty-eight deaths and a vast amount of serious sickness, could have been prevented by any additional safeguards other than pasteurization. Aside from being a strong argument for pasteurization, the epidemic suggests the advisability of making tonsilitis a reportable disease. The investigation was admirably planned and carried out and will repay a most careful perusal by sanitarians.—*Journal Infectious Diseases*, X, 1, Jan., 1912.

Covered Milk Pails

The following interesting editorial is taken from the first number of the *Clean Milk Bulletin*, published by Dr. Charles E. North of New York.

"Work which has been carried on at Homer, N. Y., for the past two years by the New York Dairy Demonstration Company under the writer's personal direction, has positively proven that the use of covered milking pails, together with the cooling of milk with ice, are two factors in clean milk production of such great importance that all other measures look small beside them. The many thousands of bacteriological tests which have been made at Homer show conclusively that the bacteria in the milk of any dairy farmer can be reduced from millions to below ten thousand, and even to a few hundreds, by the use of covered milking pails and ice. The one weak spot at the present time in the milk business is the character of the milk which the average dairy farmer brings to the shipping station. The majority of the large milk companies handle the product after it comes into their possession in practically a perfect manner. Pasteurization is becoming an exact science, but we cannot be satisfied with milk as a commodity until its character as delivered to the shipping station is of the best. There is at the present time a movement on foot among a number of the largest dealers in this country to equip their dairy farmers with covered milking pails. It is interesting to note that the city of Cincinnati has recently passed an ordinance compelling the use of covered milking pails on the part of all of the dairy farmers producing milk for that city. The files at the Patent Office show that there are somewhat over two hundred different milking pails with covers which have been invented. Some of these have been on the market for more than thirty years. There are at least a dozen different types which are simple and efficient. It is the writer's opinion that there is no one measure which will do so much to improve the general character of milk as the adoption of some good covered milking pail."

Incidentally it may be stated that this new publication is an admirable one and should find its way into the hands of all persons connected with the production, transportation, distribution and supervision of milk.

New Jersey's Health Officers' Association

This Association, although a very young one, is already of considerable importance in the advancement of modern sanitary ideas in New Jersey. Meetings are frequently held, and in this way the health officers and sanitary inspectors from all over the State are brought together. The lack of satisfactory legislation is a point that is especially emphasized by the interchange of experiences of the health officers, and as a result the Association, through its Executive Committee, has had a number of bills prepared and presented to the State Legislature. An active program to assist in the passage of the proposed legislation is also a part of the duties of the Executive Committee.

Other States might well take a lesson from New Jersey in this matter.

French Vital Statistics

Last year France again lost in its native population. In the first six months the deaths, 404,278, exceeded the births by 18,279. The year before there was an excess of 21,189 births.

As the second six months, for which the figures are not yet complete, includes the months of greatest heat, it is assumed that the whole year shows a loss, although, of course, this is more than made up by immigration from other countries.

The worst half year on record was the first half year of 1909, when there was an excess of 28,203 deaths. But this was because of unusual mortality, for even then there were more births than in the corresponding period in 1911.

Typhus Fever and the Head Louse

Following along the lines of their recent investigation on the identity of typhus fever and Brill's disease, Drs. Joseph Goldberger and John F. Anderson, of the Public Health and Marine Hospital Service, present their preliminary report on the modes of transmission of the disease. Other investigators in this field, Nicolle, Comte and Conseil (1909) and Ricketts and Wilder (1910) have successfully demonstrated the insect transmission of typhus fever by means of the bite of the body louse. Drs. Goldberger and Anderson independently verified these results and in addition turned their attention to infection by the common head louse. In their subsequent experiments on the monkey with lice obtained from hair clipped from typhus patients in Mexican hospitals they succeeded in fixing the head louse as intermediary in the transmission of typhus fever. They outline their procedure as follows:

(A) In an attempt to transmit typhus fever (Mexican virus) from man to monkey by subcutaneous injection of a saline suspension of crushed head lice, the monkey developed a typical febrile reaction with subsequent resistance to an inoculation of virulent typhus (Mexican) blood.

(B) In one of three experiments to transmit typhus fever (Mexican) from man to monkey by means of the bite of the head louse, the animal bitten by the presumably infected head lice proved resistant to two successive immunity tests with virulent typhus blood.

They confirm the observations of other investigators in their lice experiments on monkeys, *i. e.,* that as a rule infection by means of a louse bite or subcutaneous injection of ground lice was not accompanied by any very marked temperature reaction, but was proved only after incubation by immunity tests with virulent blood.

They conclude:

1. The body louse may become infected with typhus. The virus is contained in the body of the infected louse and is transmissible by subcutaneous injection of the crushed insect or by its bite.

2. The head louse may become infected with typhus. The virus is contained in the body of the infected louse and may be transmitted by subcutaneous injection of the crushed insect, and, we believe, also by its bite.—(March 1, 1912, Public Health Reports.)

Plague Conference Report

The Bureau of Science of Manila announces the publication of the International Plague Conference, which was held in Mukden in April, 1911.

The epidemic of pneumonic plague which raged in Manchuria and Northern China during the winter months of 1910-11 caused the death of nearly 50,000 people. No epidemic of this magnitude and nature has occurred in modern times, and as the knowledge concerning epidemic pneumonic plague has been meagre, the study of the Manchurian epidemic in all of its features was one of particular importance.

When the epidemic assumed alarming proportions, the Chinese Government, actuated by the highest motives of humanity, invited the eleven foreign Powers represented at Pekin to send specialists to attend an International Plague Conference for the purpose of throwing further light upon the nature of the disease and to give advice regarding methods for its prevention. This Conference was held at Mukden, one of the larger cities which suffered severely from the disease.

Economy and Efficiency in Public Health Work

"Suggestions With a View to Increased Efficiency and Economy in Public Health Work" is the subject of a paper delivered before a recent meeting of the North-Western Branch of the Society of Medical Officers of Health by Francis Vacher. Mr. Vacher is the late medical officer of health of Cheshire, and began his public health work in 1873, or two years before the enactment of the at-present-operating Public Health Act. Consequently his opinions, though naturally dealing to a certain extent with local English problems, are of general interest. His suggestions may be summed up as follows:

1. That the time has arrived for the consideration and passage of a new Public Health Act.

2. That the time has arrived for giving all Medical Officers of Health security of tenure.

3. That the time has arrived for insuring that every Medical Officer of Health has a retiring allowance.

4. That Section 2 of the Vaccination Act, 1898, be repealed as soon as possible.

5. That repeated vaccination be made compulsory.

6. That measles and chicken-pox should be added to the infectious diseases which must be notified.

7. That the theory that small-pox infection may be distributed by the air for any considerable distance is a theory which should be no longer maintained.

8. That cancer should be added to the diseases which must be notified.

9. That more systematic and thorough meat inspection should be insured.

10. That the modern practice of giving powers of control to 2 or 3 Local Authorities, re milk production or otherwise, should be used with great caution, as it may prove exceedingly inconvenient and embarrassing.

Suggestions 1, 2 and 3 have to do with conditions of more or less exclusively English interest, but suggestions 4, 5 and 7 bring us in touch with problems of our own, dealing with the control of small-pox, and the danger of the anti-vaccinationist. In advocating the repeal of Section 2 of the Vaccination Act of 1898 Mr. Vacher would do away with the exemption of the "conscientious objector," and for justification points to the disastrous results of this section as evidenced by the continued existence of preventable epidemics. The notification of measles and chicken-pox is desired because of their simulation of small-pox; that of cancer for a better understanding of the disease. American health officers will be interested in this paper not only for the inherent worth of the suggestions, but also for comparison with recent endeavors toward economy and efficiency in public health work in their own country.

(Public Health, XXV, 6, Mar., 1912.)

Factors in the Control of Diphtheria

Health officers and epidemiologists will find much of value in a paper entitled "Some Experiences in Connection With Epidemic Diphtheria," by Dr. A. E. Porter, medical officer of health of Reigate, England. Taking hold of his district (population about 27,000) in 1906, this officer was confronted with an unusual and persistent amount of diphtheria. Cases of so-called sore throat, not serious enough to require medical treatment, were found to antedate small outbreaks in certain schools, and bacteriological examinations of the throats of such cases usually revealed the presence of the diphtheria bacillus. A system of prompt enquiries into the causes of absence from school followed by investigation of suspicious cases was inaugurated to meet this condition. Chronic nasal diphtheria with an entire absence of faucial symptoms proved to be another important source of infection. Scarlet fever patients also yielded interesting results. At one time during an epidemic of scarlet fever, examinations were made of hospital cases showing no sign of clinical diphtheria; 5 out of 29 showed the Klebs-Löffler bacillus. The already discharged cases were then looked up, and in 10 out of 41 the infection was present.

Upon applying the obvious remedies for these conditions Dr. Porter was gratified to see a marked decline in the incidence of diphtheria in his district. Scientific control did away with a practically endemic condition, and brought the diphtheria mortality rate in the last three years to a point lower than had been reached since 1876. Dr. Porter at the same time points out that as long as large urban centers exist near-by it will be impossible to prevent epidemics due to imported cases. In combatting such outbreaks, and in the control of their after-effects he is a thorough believer in bacteriological methods. This piece of work is an example of what can be done in a city of this size, and is interesting because of the emphasis laid on carrier cases, especially as affecting the nose and in scarlet fever.

(Public Health, XXV, 6.)

Typhoid Epidemic at Cedar Falls, Iowa.

Cedar Falls, Iowa, was, in November and December of 1911, the scene of a sharp epidemic of typhoid fever. In a population of about 6,000 there occurred 150 cases, resulting in 16 deaths. Interesting epidemiological studies conducted by A. L. Glover of the Iowa State Board of Health and R. B. Dole of the U. S. Geological Survey indicate that the outbreak was due to the city-water supply. The age grouping of the cases, and their equal distribution upon the routes of the different milk dealers eliminated milk as a possible source of infection. In a similar manner ice-cream, butter, fruit, fresh vegetables, and oysters were proven innocent.

The Cedar Falls water is obtained from certain limestone springs situated on the banks of a watercourse close to the polluted Cedar River. The springs in question are extremely free-flowing in character, and come to the surface at one of the lowest points in the district. The water appears to come from well defined rock channels which carry it quickly from points in the drainage area to the springs, in some cases without sufficient natural filtration. Altogether ample possibility and probability were shown for the pollution of the supply. When, therefore, the recent outbreak came two weeks after a period of excessive rain and high water, and with the rest of the epidemiological evidence as stated, there could be little doubt as to the vehicle of the disease.

The outbreak is interesting as another example of a clear-cut water-borne epidemic, and as showing the danger attending the use of such supplies—usually pure, but occasionally polluted. The weakness of laboratory tests alone is again shown. Chemical analyses in the past have given this water a clean bill, and bacteriological examinations made after the onset of the epidemic failed to indicate any considerable pollution. The water is now being disinfected with bleaching powder, and the people have been instructed to boil their drinking water. It has been recommended that the city sewerage system be extended, and that a new water supply be obtained, either from deeper wells or by filtering the Cedar River water.

(Eng. News, Vol. 67, No. 12.)

Infantile Paralysis in England

The Local Government Board has just issued a special report on epidemic poliomyelitis. (New Series, No. 61.)

Papers are presented by Dr. R. J. Reece, Dr. Reginald Farrar, Dr. Mervyn Gordon and Dr. Hugh A. Macewen.

The report is a full one (151 pages) and contains reviews of the experimental work done on poliomyelitis and of the literature dealing with its epidemiology and clinical character. It should be in the hands of all students of this disease.

Epidemic of Typhoid in Coatesville, Penn.

A severe epidemic of typhoid fever has recently broken out in Coatesville, Penn., a small town drawing its water supply from two streams, Sucker Run and Heffner Creek. As early as August 1, 1910, and again on December 15, 1911, State Health Commissioner Dixon condemned this source of water supply, declaring in the first instance that "the danger of an epidemic of water-borne disease, notably typhoid fever, is very grave," and later, the water to be unfit for consumption. He ordered the immediate installation of a hypochlorite sterilizing apparatus at the waterworks intakes and a submittal of plans for a filtration plant for approval by the State Board of Health. The Waterworks Commissioners, heedless of this order and now confronted with the problem of deficient water supply, secured an increase of the latter by tapping a small stream situated below a hospital harboring typhoid patients. This was done without written permit from the Health Commissioner, thereby violating the "Pure Water Act" of 1905. The last move was followed by an outbreak of typhoid fever, with 200 cases and 2 deaths reported up to February 20, 1912. Dr. Dixon immediately installed a sterilizing plant and has from latest reports full control of the situation.

This sad experience is not to be looked upon merely as a supporting link in our hypothesis, strengthened by our study of a half century, *i. e.*, that typhoid is a water-borne disease and that the typhoid rate is the automatic register of the sanitary quality of a water supply. It should, however, serve to bring out forcibly the laxity in waterworks operation, and more strongly, the lack of uniformity in local and State Health rulings and the absence of co-operation between the local and State boards of health.

(Abstract of Editorial, Eng. Record, March 9, 1912.)

Tropical Diseases

To the student of tropical diseases a recent English Blue Book entitled a Report of the Advisory Committee for the Tropical Diseases Research Fund (Cd. 6024, 1912) will prove both interesting and valuable. This volume contains both the reports of the four Laboratories located in England which are making investigations on tropical diseases and those of Colonial Laboratories. Much information is given concerning yaws, pellagra, beri-beri, dengue, Oriental sore, sleeping sickness, etc.

Mongoose Versus Snakes

In order to control a poisonous snake of very deadly character in St. Lucia (Windward Islands) mongoose were imported, as these animals are a natural enemy of the snakes. Dr. Lucius Nicholls in a recent report* gives some interesting facts concerning the outcome. He states that at first the mongoose had no natural enemies and with an abundant food supply multiplied very rapidly and destroyed all of the snakes in and around towns, villages and settlements. However, it has been a mixed blessing, as it has practically exterminated several birds that nest on the ground, harmless snakes which were of value as rat destroyers, "and has greatly diminished those good destroyers of insects—the lizards; besides, it has devoured innumerable rats, until that wily creature altered its methods of living and made nests in the trees, and spent the night hunting for food, for the mongoose hunts by day."

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*Report of Advisory Committee for the Tropical Diseases Research Fund.

This vast amount of food being lost or lessened, and that which remains having no doubt learnt to keep one eye on the mongoose, this little animal has naturally started to diminish; and it will continue to do so until some balance is reached between itself and its food supply. With the ebb of the mongoose there is the flow of the serpent."

Dr. Nicholls points out that when this balance is established between the mongoose and the snake, the latter "will never again become the terrible pest he was." . . .

The necessity for great care to be taken before an animal is introduced into a new country is indicated by Dr. Nicholls. The entire possibilities of breeding and destruction which may result should be most carefully considered. Dire results have occurred through the introduction of some form of plant or animal life by irresponsible persons. "It is time, indeed, that this matter were controlled by law."

Tricks of the Trade

"In an address to the Carlisle Microscopical Society last week, Dr. F. H. Morison (C.M.O., Cumberland) alluded to the tricks of meat fakers. He recalled the story of the butcher in the country village who sent word to his customers that he would have pork on a certain day. When the day arrived and the pork was not forthcoming, the messenger was asked why, and he said, "Oh, the pig got better." Most of them had known instances where an animal had, as an Irishman would say, been killed to save its life; that was when an animal which was fattening for the market fell ill, it was slaughtered and sent into the district as good butcher's meat. Such things were well known in every district where meat inspection was properly carried out. Referring to the 3 per cent. fat standard for milk, Dr. Morison said that in prosecutions they sometimes found that an appeal was made to the cow. They knew of a case in which this was done and the appeal was successful, a cow in the vendor's byre actually yielding milk with a less percentage of fat than three. In other prosecutions which followed in the same district similar appeals were made, and the inspector was surprised to find that the same cow to which the appeal had been made in the first instance had been borrowed by the others for the occasion."

Medical Officer (London), February 24, 1912.

Rocky Mountain Spotted Fever, Rodents and Ticks

Farmers' Bulletin 484 (U. S. Department of Agriculture) deals with the relation of some of the common mammals of Western Montana to agriculture and Rocky Mountain spotted fever. The Bulletin has been prepared by Clarence Birdseye, Assistant, Bureau of Biological Survey, and is a splendid exposition of the serious depredations of ground squirrels, chipmunks, woodchucks, mice, rats, gophers and rabbits on agriculture and the serious relation between these animals and spotted fever. This disease is communicated by the bites of the spotted fever tick (Dermacentor venustus) and these ticks during their two younger stages live on small rodents and during their adult stage on domestic animals.

The methods to be used in destroying the offending animals are discussed and the bulletin is exceedingly well illustrated. Mr. Birdseye summarizes his study as follows:

"Spotted fever is communicated from wild animals to human beings by the bite of infected wood ticks.

"The most feasible ways of controlling the fever are: (1) To educate the inhabitants of infested localities in a belief in the 'tick theory'; (2) to lessen the number of wood ticks by (a) keeping domestic stock, the principal hosts of the adult ticks, tick free, and (b) lessening the number of native rodents, the necessary hosts of the younger states of the ticks; and (3) to destroy those native rodents which may serve as a source of continued reinfection of the ticks.

"The destruction of harmful rodents in certain fever-infested parts of Western Montana is doubly worth while, for there they not only are very destructive to crops, but are partly—probably fundamentally—responsible for the occurrence of the disease. Co-operation by all landowners in a district is essential to the success of any extensive campaign of rodent destruction. Poisons should be prepared in bulk by State experiment stations, counties, chambers of commerce, farmers' unions, or other organizations, and then distributed at cost to individuals. By the adoption of these common-sense and comparatively simple methods there is every reason to believe that within a few years spotted fever in Montana will be practically a thing of the past."

The Massachusetts State Healt Inspectors

A pamphlet by the State Board of Health of Massachusetts entitled "State Inspectors of Health of Massachusetts, Who They Are and What They Do," has recently been issued. Besides being of a great value to the citizens of the State, the pamphlet is of general interest as it tells of the unique organization of this State Board of Health. Massachusetts is divided into fourteen sanitary districts, each of which is in charge of a sanitary inspector. Their powers and duties are the gathering of information concerning "all influences that are or may be dangerous to the public health and keeping a close watch on all communicable diseases." The inspectors also keep the State Board of Health informed with regard to the enforcement of the laws relating to the maintenance of isolation hospitals, tuberculosis hospitals and dispensaries. One of the most important functions is to study the effects of occupation on health by considering "the existence of occupational diseases in industrial establishments." A study of the complete reports of the district inspectors with regard to their work along the lines of Industrial Hygiene is well worth while to anyone who desires to keep posted on some of the most progressive work being accomplished in this direction.

Dr. Wm. C. Hanson, the assistant to the Secretary of the State Board of Health, has specialized in this important field and much credit is due both him and the districts inspectors in eradicating many existing evils in factories and workshops. The following progressive recommendation contained in the last annual report of the work of the district inspectors is of particular interest:

"In order that occupational diseases shall be reported, it is recommended that the present law requiring the State Board of Health to anthorize and define what diseases shall be deemed to be "dangerous to the public health" be so amended as to include such occupational diseases or definite symptoms of disease due to occupational processes or conditions, as the State Board of Health may from time to time deem necessary."

The lack of proper statistics of morbidity and mortality of the various dangerous industries has been one of the most serious deficiencies in this country and it is greatly to be hoped that the recommendation may shortly become a law.

The district inspectors coöperate with local Boards of Health in many ways and help to stimulate backward towns to adopt proper measures to protect the public health. Sweat shops, mercantile establishments, police stations, prisons and slaughter houses are all inspected by the local representatives of the State Board of Health.

In a general way it may be said that the district inspectors are of distinct aid to local health authorities and perform a very useful function in the State.

The Dangerous Typhoid Carrier

Readers of these notes for January may recall an outbreak of typhoid fever in New York reported by Drs. Bolduan and Noble in which they demonstrated that a typhoid carrier in Camden, N. Y., was the source of the disease. Still another such outbreak is recorded by these investigators in a recent number of the New York Medical Journal. On one day in February, 1910, nine cases of typhoid were reported in a small district in New York, six further cases were reported on the following day and for several weeks new cases were brought to light each day.

By a process of elimination, milk was found to be the one common factor (excepting the municipal water supply, of course) in the majority of the cases. Investigation of the supply revealed the fact that at one of the creameries where the milk came from, six cases of typhoid fever "had suddenly appeared practically simultaneously with the cases being studied in New York." These six cases were found to have occurred in the households of employees of the creamery, all of whom obtained their milk from the creamery.

Forty-five dairies supplied this creamery and a thorough study was made of these, with the result of the discovery of a farmer "who gave a history of 6 cases of typhoid fever on his farm in 1904, one case in 1907 and one case in 1908."

Enormous numbers of typhoid bacilli were found in the stools of the farmer.

Conditions in general were found to be satisfactory on the farm, but the authors point out, and with truth, that at times even with the cleanest milk producer, a certain combination of things will lead to the infection of the milk. The difficulties of combatting in New York typhoid from such carriers except by efficient pasteurization is well summed up by the authors as follows:

"The dairies shipping milk to this city number more than 40,000, and the number of persons engaged in handling the milk must be nearly 200,000. It is manifestly impossible to examine the excreta of this large number of individuals in order to discover typhoid bacillus carriers. Some advance will be made when every person who has been known to have had typhoid fever and who is engaged in producing or handling milk must undergo the necessary bacteriological examinations in order to prove that he is not a bacillus carrier. In engaging dairy and creamery help, or other persons coming into contact with milk sold to the public, inquiry concerning a previous history of typhoid fever should be made and action taken accordingly. It may be found feasible to enforce some such requirements for the exclusion of bacillus carriers from the dairy industry in the case of the better grades of milk, those selling at retail for 12 cents a quart and more. So far as the ordinary milk is concerned, however, and this constitutes the bulk of the milk sold in this city, it seems impossible to guard against this form of infection in any other way than by efficient pasteurization."

An account of a second outbreak of a similar nature has just been published in Dr. Carnwath's Report to the Local Government Board upon an outbreak of typhoid fever at Oakenshaw, England. (New Series, No. 59.) In this epidemic 74 cases occurred. It was demonstrated that the woman who washed the milk vessels was a typhoid carrier. The evidence in this case leads Dr. Carnwath to believe that the woman had been a carrier for a number of years. He asks the question why she did not give rise to an epidemic prior to the recorded one and suggests that it may be explained by the known "intermittency of the carrier" or by an increased potency for infection acquired by the woman. With regard to this latter hypothesis, it is noted that the son of the woman had a sickness which was probably a mild attack of typhoid the year before the general outbreak, and it is suggested that "it may perhaps be that he received the infection from his mother." She nursed him and "it is just possible that at this time Mrs. X. (*i. e.*, the mother) became reinfected . . . . with a fresh typhoid bacillus from the patient—with her own bacillus, perhaps rendered more virulent, by passage through the susceptible body of her son."

A Comparison

The following forceful statements are taken from the editorial pages of the April issue of Life and Health:

"A health official from one of the Southern States attended the meeting of the American Public Health Association in Havana, and returned a wiser man, but he was heartily ashamed,—ashamed for his own city, his own State, his own nation.

"What had he learned? He already knew that an American, Colonel Gorgas, had gone to Havana in 1900, and taught the Cubans the value of sanitation. What amazed him was the intelligence and energy displayed by the Cubans in putting this knowledge into practise. Instead of an island infested with mosquitoes and flies, as one has a right to expect in the tropics, he found these insects practically driven out! Fly-screens are not used on the houses, because they are not needed.

"What is the secret?—The Havanese have taken seriously the proposition that the protection of the health of the people is an important function of the government, and that a low death-rate is a valuable commercial asset, and they began their government with a national department of health. The patent-medicine fakers were not in evidence when the constitution was formed.

"Cuba pays annually 46 cents per capita on her national health. Does any American State or American city or the entire government of the United States pay as much? Since the beginning of the new order of things the death-rate of Cuba has dropped from 17.35 per thousand to 13 per thousand, which means a saving on the island of 9.570 lives a year, or more than 25 a day. If the death-rate of the United States could be reduced to 13 per thousand, and it *could* if we went about it as earnestly as the Cubans are doing, for our climate is at least as good as that of tropical Cuba,—it would mean a saving of 180,000 lives a year, or 500 lives a day!

"We pose as one of the great civilizing nations of the world. We have some of the greatest scientists in medicine; and *when we see that the saving of life has a commercial value,* as in the building of the

Panama Canal, we can save life and prevent disease as no other nation has ever done. But where life-saving does not show immediately in dollars and cents, there is no people more neglectful. . . . .

"Here are some of the facts presented by the Southern health officer who visited Cuba. The capital of Cuba has a death-rate of 11. The capital of his State has a death-rate of 23.5, *more than double.* The Cubans spend 46 cents per capita on public health; his city spends 2 cents per capita on public health! I forbear to mention the name of the city, but there are others that are in as backward and disgraceful a condition. We as a nation should place just a little emphasis on the dollar, and a little more on life and health."

Control of Venereal Disease in New York City

Of vital importance is the recent action of the New York City Department of Health looking toward the reporting of cases of venereal disease. This matter has been under consideration for some time, and already in July last the Board of Estimate included an appropriation of $55,000 for a new venereal disease hospital to be erected on North Brother Island. Now, February 20, 1912, the Department has come forward with resolutions requiring the reporting of all such cases treated in public institutions (including those supported in whole or in part by voluntary contributions), and requesting the reporting by physicians of private cases. With regard to the latter cases the name of the individual need not be furnished, but unless the case is reported the Department will not make free diagnostic tests or supply curative sera.

The resolutions in full are as follows:

Whereas, The venereal diseases are infectious, communicable and preventable, and constitute a serious menace to the public health, thus properly coming under the charge of the public health authorities, and

Whereas, It is well established that no administrative control of such diseases is possible without a system of notification and registration, associated with provision for the municipal care of patients unable or unwilling to place themselves under proper medical care and to take the precautions necessary to prevent the infection of others,

Be It Therefore
Resolved,

First, That on and after May 1, 1912, the superintendent or other officers in charge of all public institutions such as hospitals, dispensaries, clinics, homes, asylums, charitable and correctional institutions, including all institutions which are supported in whole or in part by voluntary contributions, be required to report promptly the name, sex, age, nationality, race, marital state and address of every patient under observation suffering from syphilis, in every stage, chancroid, or gonorrhœal affection of every kind (including gonorrhœal arthritis), stating the name, character, stage and duration of the infection, the date and source of contraction of the infection, if obtainable, and

Second, That all physicians be requested to furnish similar information concerning private patients under their care, excepting that the name and address of the patient need not be reported.

Third, That all information and all reports, in connection with persons suffering from these diseases, shall be regarded as absolutely confidential, and shall not be accessible by the public nor shall such records be deemed public records.

Fourth, That the Department of Health shall provide facilities for the free bacteriological examination of discharges for the diagnosis of gonorrheal infections, and also shall provide, without charge, vaccines for the treatment of such infections, and

Fifth, That the Department of Health shall undertake to make, without charge, the Wasserman and the Hoguchi tests for the diagnosis of syphilis and examine specimens for spirochetes.

Sixth, That these diagnostic and therapeutic facilities be extended only when the data required for the registration of the case be furnished by the physician treating the patient, and

Seventh, That the Department provide and distribute circulars of information in relation to these diseases.

VOL. II. APRIL 1912 No. 4

AMERICAN
JOURNAL OF PUBLIC HEALTH

SANITARY ENGINEERING SECTION AMERICAN PUBLIC HEALTH ASSOCIATION

To the Members of the Sanitary Engineering Section of the American Public Health Association:

GENTLEMEN:

The Sanitary Engineering Section of the American Public Health Association was authorized at the Annual meeting of the Association, held in Havana, December, 1911, and organized on January 18th, 1912, in the rooms of the American Society of Civil Engineers in New York City, at the call of Col. J. L. Ludlow, Chairman of the Organizing Committee. There were 15 members of the American Public Health Association present, and after the adoption of a constitution, the following officers were elected:

RUDOLPH HERING, *Chairman*, 170 Broadway, New York.
J. L. LUDLOW, *Vice-Chairman*, Winston-Salem, N. C.
H. D. PEASE, *Secretary*, 38 W. 39th St., New York.
GEORGE C. WHIPPLE, *Recorder*, 103 Park Ave., New York.

Members of the Council.

Andrew J. Provost, Jr., of New York, F. A. Barbour of Boston, Mass., Langdon Pearse of Chicago, Ill., Wm. Paul Gerhard of New York, Frederic H. Bass of Minneapolis, Minn.

The intimate relation, regarding matters of public health, which exists between the science of biology, the practice of medicine and the science and practice of sanitary engineering, has been the cause of establishing this section.

From the biological and medical professions, which should formulate and present the phases which control the design and operation of all public works relating to sanitation, the Section should receive statements of facts, experiences, and opinions, clearly and definitely setting forth the requirements of public works, such as air and water supplies, sewage and refuse disposal, street and river cleaning, in order to maintain and promote to the highest practicable degree those phases of public health which are affected by such works.

From the engineering profession, the Section should receive statements of facts, experiences and opinions, setting forth the practical means by which the biological and medical requirements for public works can be fulfilled, as regards efficient designs for works to accomplish these ends and as regards economy of their construction and operation, with due regard also to public comfort and the avoidance of nuisance.

The Chairman begs to call attention to the fact that since the birth of the American Public Health Association, most of the above mentioned subjects have been given more or less of a scientific foundation, thus making it possible in a large measure now to predict with certainty the beneficial sanitary effects both as to health and nuisance questions. This progress has related chiefly to matters of water and sewage purification and to the disposal of refuse. While much information is still desired concerning modifications and details of these branches of the general subject further investigations should be made, particularly such as relate to details of design and economy of operation and management.

Some uncertainty still prevails in the public mind on the question of pollution of streams and as to the extent to which such pollution can be prevented. Papers on this subject, which increase our knowledge of actual facts, are therefore quite important and timely, and will aid in establishing a broader scientific foundation for future treatment of this subject than we have at present.

The most uncertainty prevailing in the public mind, however, relates to the subjects of air pollution and ventilation. Therefore, papers on this subject are most important. It is desirable in the first place clearly and definitely to set forth and to establish the biological facts, observations, and opinions regarding the sanitary effects of the usual forms of atmospheric air pollution in and about habitations, and in the second place to establish the effects of changing temperature, humidity and air currents upon health and comfort. After a fairly satisfactory establishment of these more or less fundamental requirements has been secured, it will then become practicable for the Sanitary Engineer to provide works fulfilling these requirements in the most effective way and at the lowest cost.

In order to facilitate the selection of a topic for a paper to be presented in this new Section, the appended list is suggestively offered and it is hoped that members will find therein subjects upon which they will present papers at the meetings.

The list extends pretty well over the entire field of Sanitary Engineering as it is conceived today. Some of the topics could be satisfactorily dealt with by short answers or very short papers. This fact should not prevent anyone from contributing them if he has some definite facts and experiences to communicate. Other topics are quite large in their scope and require much investigation and experimentation before proper treatment could be given them.

Respecting the latter group, and relating chiefly to the biological and medical phases of the general subject, it is hoped that we may obtain the co-operation of some of the principal Laboratories of Research in this country and abroad.

Respecting still another group of subjects, the work required would be chiefly a search through literature in order to collate and compile the data already known, and to adjust and apply them for the present purpose.

It is hoped that there will be no hesitation to expend this labor for the advancement of sanitary engineering and that contributions of facts, experiences and opinions will be sent to the Recorder of the Section, George C. Whipple, 103 Park Avenue, New York, on any of the subjects, even though they be short, so that at our next meeting we may already see a substantial step towards advancing these interests.

The next meeting of the Association will be held in Washington, D. C., September 18th–20th, 1912, in conjunction with the International Congress on Hygiene and Demography, immediately preceding that Congress. Members attending the meeting of the Association can thus at a minimum expenditure of time and money attend this Congress also.

Respectfully,
Rudolph Hering,
Chairman.

January 22, 1912.

APPENDIX TO LETTER OF RUDOLPH HERING.

SANITARY ENGINEERING SECTION OF THE A. P. H. A.

SUBJECTS FOR INVESTIGATIONS AND COMPILATION OF KNOWN DATA, REPORTS AND PAPERS.

I. AIR SUPPLIES.

PROBLEMS AND COMPILATIONS OF DATA, PHYSIOLOGICAL AND PATHOLOGICAL IN CHARACTER, INCLUDING METHODS OF EXAMINATION.

Physiology and Pathology of Respiration.

Principles involved in normal human respiration.

Methods of determining physiological and pathological variations from the normal respiration.

Character and composition of exhaled air under varying conditions of age, sex, activity and occupation.

Variations in Chemical Constituents of Air.

Range of variations in the chemical constituents of air which may be considered normal.

Pathological effects of abnormal variations in chemical constituents of air, under altered conditions of inhabited territory, prevalence of factories, etc.

Pathological effects when variations in chemical constituents are due to insufficient exchange of air in enclosed spaces.

Variations in Physical Conditions of Air.

Range of temperature and humidities best suited to the human body under the usual varying conditions of air, age, sex, activity, occupation and climate.

The most comfortable average temperatures within enclosed spaces. Explanation of the fact that the usual preferred temperatures in Europe are lower than in America. Is it due to habit, to climate, or other differences?

Physiological and pathological effects of excessively high summer and low winter temperatures, and of excessive degrees or rapid changes of temperature and humidity of air upon human bodies, in active and quiescent states, and when sleeping.

Physiological and pathological effects of currents of artificially heated air, dry and moist, with reference both to contact with skin and to inhalation.

Physiological and pathological effects of working in compressed air in deep earth or subaqueous foundation or tunnel work.

Physiological and pathological effects of the ordinary physical and chemical changes from normal air as indicated by variations in heart action and blood pressure, in varying conditions of health at different ages and for various types of disease.

Physiological and pathological effects of clothing of varying character, under varying physical conditions of the air and of age, sex, activity and occupation.

Differences in physiological effects between radiant heat and direct contact with hot air.

Physiological and pathological effects, respectively, of hot air, steam and hot water heating plants.

Physiological and pathological effects of artificial cooling plants.

Quantities of fresh air required per person per minute under varying conditions of composition, temperature and moisture of air, of sex, age, activity, occupation and during various types of disease and under different climates.

Bacterial and Other Particulate Constituents of Air.

Range of variations in the bacterial constituents of air which may be considered of no importance pathologically.

Pathological effects of abnormal numbers and kinds of bacteria in air.

Physiological and pathological effects of preventable and unpreventable inorganic and organic dusts in the atmosphere in (*a*) unenclosed spaces (*b*) enclosed spaces (*c*) factory districts.

Physiological and pathological effects of odors.

Physiological and pathological effects of noxious gases in (*a*) unenclosed spaces (*b*) enclosed spaces (*c*) factory districts.

Relation of vegetation to quality of air supplies for human beings.

PROBLEMS AND COMPILATIONS OF DATA, PHYSICAL IN CHARACTER, INCLUDING METHODS OF EXAMINATIONS.

Atmosphere of Unenclosed Spaces.

Changes of the relative proportion of the constituents of normal air under natural conditions taking place under the altered conditions of an inhabited territory with prevalence of factories, etc.

Causes producing the various kinds of preventable and unpreventable dust in cities and elsewhere.

Quantity and kind of dust determined by weight and volume per space and area units, in different city districts and under several average weather conditions, and best means of measuring it.

Unpreventable quantity and quality of dust contained in the air near the ground of country and city districts, and of the upper atmosphere.

Amounts and character of various types of street dust.

Relation of air velocity to dust settling and dust raising from dry surfaces.

Air in Enclosed Spaces.

Percolation of air under pressure through different building materials.

Effect of wind pressure upon the quantity of air entering buildings through narrow crevices around closed doors and window.

Effect of open windows when the wind blows in or exhausts, upon the exchange of air in rooms. Quantitative data. Experimental results.

Effect of chimneys terminating in open fire places with or without fires upon the air exhaust.

Natural causes and character of air circulation in enclosed spaces, under ordinary practical conditions, and methods for indicating the same.

Effects of artificial heating on the circulation of air in enclosed spaces, by grate fires, by hot air or steam radiators, at windows and elsewhere, by stoves and by hot air registers introducing heated air.

Quantity and kind of dust in variously occupied enclosed spaces. Living rooms, halls, factories, etc.

Effect of heating air upon the organic dust particles usually contained therein.

Physical and chemical effects upon the air of enclosed spaces, respectively by hot air, hot water and steam heating apparatus, including the effect of heating air upon organic dust particles contained therein.

PROBLEMS AND COMPILATIONS OF DATA, ENGINEERING IN CHARACTER, INCLUDING METHODS AND COSTS.

Control of Physical and Chemical Air Conditions in Enclosed Spaces.

Practical means for indicating the actual air circulation within halls and rooms.

Methods of producing and regulating the artificial advent of fresh air to enclosed spaces.

Aerodynamics of the plenum and vacuum systems of ventilation.

Methods of automatically controlling the temperatures of air in enclosed spaces.

Methods of automatically controlling the humidity of air in enclosed spaces.

Most efficient methods of ventilation of railroad coaches.

Control of Air Conditions in Enclosed Spaces as Regards Dust, Bacteria and Odors.

Methods of removing dust from artificial systems of heating and ventilating by means of filters, washers, etc.

Most effective and economical methods of dust suppression in enclosed spaces.

Artificial purification or disinfection of polluted air.

Cost of ventilating systems and their adjuncts and of their operation.

Control of Air Conditions in Unenclosed Spaces as Regards Dust, Bacteria, etc.

Most effective and economical methods of dust suppression on city streets and country roads.

Means of suppressing dust by reducing the causes of its generation and reducing the opportunities of its rising into the air.

Effects of sprinkling as compared with washing or flushing with water to hold down dust, applicable to surfaces of streets and roads.

Least quantities of water required for dust suppression on public thoroughfares under various conditions of actual practice.

Duration of effects, as regards dust suppression, of plain water sprinkling on different kinds of pavements and during different seasons, during average and strong winds, and during sunshine, as compared with the effects due to a mixture with delequescent and hygroscopic salts.

Duration of effects, as regards dust suppression, of sprinkling oleaginous compounds, as oils, tars, bitumens, etc., upon macadam roads.

II. WATER SUPPLIES.

PROBLEMS AND COMPILATION OF DATA, PHYSIOLOGICAL AND PATHOLOGICAL IN CHARACTER, INCLUDING METHODS OF EXAMINATION.

General Quality.

The best normal characteristics of public water supplies from a standpoint of public hygiene, as to chemical quality, hardness, odor, taste, color, turbidity, harmless and pathogenic bacteria, plankton, vegetation, fish life, etc. Safe limits.

Physiological and pathological effects of excessive variations beyond the safe limits of each of the above mentioned best normal characteristics of water supplies.

Physiological and pathological effects of using drinking water habitually supplied at temperatures between 50° and 72° F., and also when artificially cooled by mixing with ice.

Bacterial and Other Constituents.

Effect of long storage on bacterial contents of water.

Effect of plankton and other higher forms of vegetable and animal life on bacteria.

Longevity of typhoid bacilli and other pathogenic bacteria in water under different conditions.

Hygienic advantages of public as against individual water supplies.

Hygiene of swimming pools.

Hygienic Efficiency.

Slow sand filters under different conditions. Limitations.

Rapid mechanical filters under different conditions. Limitations.

Treatment of waters with hypochlorite of lime and soda, ozone, ultra violet rays, etc.

Small domestic water filters.

Cistern storage on private residences.

Indirect hygienic results from water purification.

PROBLEMS AND COMPILATION OF DATA, PHYSICAL, CHEMICAL, AND BIOLOGICAL IN CHARACTER.

Aeration.

Laws controlling the absorption of oxygen by water and the elimination of dissolved gases from water exposed to the air under different conditions.

Effect of aeration and sun-light on the natural purification of water.

Sedimentation.

Laws controlling the sedimentation of particles suspended in water.

Best types and general dimensions of basins for sedimentation.

Effect of baffling the flow upon the settling of suspended matter.

Clarification of turbid waters by plain sedimentation and precipitation with chemicals.

Storage of Water.

Relation between winds and currents.

Under currents in lakes and ponds.

The effect of temperature on vertical circulation in lakes, ponds, or reservoirs.

Effect of thermal stratification on the distribution of plankton, dissolved oxygen, etc.

Effect of muddy bottom on the quality of stored water. Effect of soil stripping on reservoir sites upon stored water.

Conditions that control the growth of algae and plankton in stored waters.

Special Water Treatments.

Physical, chemical and biological aspects of water sterilization, water softening and of special treatment upon the removal of color, iron, and all tastes and odors.

Effect of Construction Materials.

Red water plague, its causes and prevention.

Lead poisoning, its cause and prevention.

PROBLEMS AND COMPILATIONS OF DATA, ENGINEERING IN CHARACTER, INCLUDING METHODS AND COST.

Ground Waters.

Common sources of pollution of springs and ground waters.

Best method of protecting wells against pollution.

Storage of ground waters to guard against subsequent contamination, growth of algae, effects of sun-light, heat and dust.

Domestic Supplies.

Efficiency of house filters and tap filters.

Efficiency of cistern water supplies.

Advantages of public as compared with private domestic supplies.

Preliminary Filters.

Different methods and their relative advantages as compared with sedimentation. Limits of efficiency.

Slow Sand Filtration.

Common sources of pollution of surface waters.

Design and construction of sand filters with reference to hygienic efficiency.

Operation of filters, standardization of records, analyses, cost, etc.

Methods of sand washing with reference to hygienic requirements.

Rapid Mechanical Filtration.

Special efficiency and advantages of mechanical filtration of turbid waters.

Design and construction of mechanical filters with reference to hygienic efficiency.

Operation of filters, standardization of records, analyses, cost, etc.

Relative advantages of different coagulants under different conditions.

General.

Operation and management of public water supplies from a hygienic standpoint.

III. SEWAGE COLLECTION.

PATHOLOGICAL AND NUISANCE DATA.

Pathological dangers arising from improper and unclean sewage receptacles and ruptured pipes within buildings.

Pathological dangers arising from street water inlets and catch basins in streets. Mosquito breeding in catch basins.

Conditions favoring and conditions preventing pathological dangers arising from flowing sewage within the main sewers of a city on its way to points of final disposal.

ENGINEERING DATA.

Design, ventilation and cleansing of the usual sewage receptacles and pipes in buildings from a hygienic standpoint.

Design, ventilation and cleansing of street sewers and their appurtenances from a hygienic standpoint.

Separate versus combined sewage collection from a hygienic standpoint.

IV. SEWAGE DISPOSAL.

PATHOLOGICAL AND NUISANCE DATA.

Pathological dangers and nuisances from air pollution and from effluents at the different styles of sewage purification works.

Pathological dangers and nuisances inherent to the essential features of works for economically purifying sewage, which features consist in:

(1) Substantially separating the liquids from screenings, and from the bulk of suspended matter settling as sludge. Danger from bacteria getting into the atmosphere and being scattered when removed from screenings. Value of disinfection.

(2) Oxidizing the liquids, Danger from pathogenic bacteria in sewage, entering bodies of water, infecting fish, cattle, bathers, etc. Danger due to splashing at sewage sprinklers when bacteria may be scattered by air movements. Danger from bacteria being picked up and scattered by strong winds passing over the surface of sewage filters. Danger from flies and other winged insects which are bred in sewage filters. Danger from insufficiently purified effluents.

(3) Decomposing the screenings and sludge. Possibility of survival of pathogenic bacteria during the process of decomposition of organic matter under soil and under water.

PHYSICAL, CHEMICAL AND BIOLOGICAL DATA.

Dilution.

Oxidation of sewage liquids by dilution in large bodies of water with various degrees of saturation with oxygen.

The necessary dilution required for effluents from upper chamber of Imhoff tank to become non-putrescible.

The reduction in quantity of putrifying matter, by removal of settled sludge, in its relation to the reduction in quantity of water required for necessary dilution.

Screenings and Sludge.

Decomposition of sewage screening and of sludge by spreading out on land.

Decomposition of sewage screenings and of sludge by burial in porous soil.

Decomposition of sewage screenings and of sludge by submergence in water. Imhoff tanks, Travis tanks, septic tanks, etc.

Forces transforming sewage sludge compared with forces making forest and field soil.

Filtration.

Oxidation of sewage liquids by intermittent sand filters.

Oxidation of sewage liquids by coarse-grained percolating beds or sprinkling filters.

Oxidation of sewage liquids by contact beds, slate beds, etc.

Chemical and biological character of films covering the grains in a sewage filter.

Area in square feet of ripe bacterial surface in a sewage filter, freely exposed to air circulation, which is required to oxidize the average quantity of sewage from the average city inhabitant, to a degree of non-putrescence and to a degree of high purity.

Relation of bacterial activity to the degree of fineness of the organic matter in suspension or in semi-liquid colloidal form.

Practical limits of prior removal of suspended matters to secure efficient and economical action by bacterial and other forms of life within the filters.

Fauna and flora found within sewage filters and their relation to the process of sewage purification.

Relation of temperature of the sewage within a filter to the biological and chemical activity within the same, that is, the degree of purification accomplished at different temperatures. Actual temperatures and conditions of maximum and minimum efficiency. Rate of change of activity as temperature increases or decreases.

Quantity of freely supplied air which is required to oxidize the sewage from the average person to a degree of non-putrescence.

Relation of quantity of air supply to intensity of bacterial oxidation, assuming that a sufficient amount of bacterial food is always available.

Length of time required for average sewage of varying strengths exposed to bacterial action in filters under otherwise suitable conditions, to become non-putrescent and to become highly purified.

General.

Fundamental theories regarding sewage purification and factors accomplishing it.

ENGINEERING DATA.

Sludge.

Works for substantial separation of sewage liquids and sludge by screening, settling basins, precipitation basis, Imhoff and Travis tanks.

Design, construction and operation of works for treating sewage sludge according to the several ways employed for accomplishing it, so that all hygienic requirements are satisfied.

Methods of disinfecting sewage sludge for hygienic purposes, and their cost.

Filters.

Extent of surface, in square feet per cubic foot, or square meters per cubic meter, of the grains of sand and broken stones, slag, etc., of varying average diameters, which is practically available for bacterial life and activity.

Relation of air circulation to degree of porosity of medium.

Most efficient means of aerating sewage while percolating through beds of sand or stone.

Frictional resistances of sewage percolating through beds with various sizes of interstitial spaces.

Differences in rate of percolation between sewages having different degrees of strength.

Length of time required for sewage matter, which is non-resistant, unstable or easily decomposed, to percolate through sand and broken stone filters of different average diameters to a given depth.

Design, construction and operation of works for oxidizing liquid sewage, substantially relieved of suspended matter, so that all hygienic requirements are satisfied.

Methods of disinfecting sewage liquids for hygienic purposes and their cost.

Dunbar's theory of purification by absorption in bacterial film surrounding the grains of a filter bed.

Length of time required for oxidizing organic matter of definite character to a definite degree: 1. in solution, 2. in fine colloidal form, and 3. in suspension as gross solids.

Absorption of air by water while standing, while flowing, and while being sprayed, for different degrees of dissolved oxygen already contained in the water.

General.

Cost of sewage disposal works, construction and operation.

V. REFUSE COLLECTION.

Solid city refuse is made up of the following classes: Garbage, Dead Animals, Night Soil, Manure, Street Sweeping, Ashes and General Rubbish and Dust.

PATHOLOGICAL AND NUISANCE DATA.

Pathological dangers and nuisances arising from the several classes of solid city refuse, immediately and after one or two days', or a week's retention of the same.

Conditions and practices favoring and preventing pathological dangers and nuisances from the various classes of solid refuse between the points of origin and final disposal.

ENGINEERING DATA.

Advantages and disadvantages of separate and of partially combined or mixed collections of the several classes of solid refuse, from the standpoint of hygiene, convenience and cost.

Daily quantities per 1000 persons of the several classes of refuse produced in different countries, in cities of the same country, and in districts of the same city. Variation of the quantities with the seasons.

Best materials for and the best forms and sizes of receptacles for the several kinds of refuse, for different classes of cities and in different climates, from the standpoint of hygiene, convenience and cost. Advantages of wrapping garbage in paper.

Best location for placing the receptacles to be collected.

Frequency of collecting the several classes of refuse at different seasons, from different parts of a city and in different climates from the standpoint of hygiene, convenience and cost.

Advantages and disadvantages of day and of night collection.

Economical length of haul from points of collection to points of delivery, as related to separate and mixed collections and to time spent in loading and spent in hauling.

Best materials, forms and constructions of collecting wagons, from the standpoint of hygiene, convenience and cost.

Most economical sizes of collecting wagons, under the usual conditions of large and small cities, to accomplish the best efficiency. Single or double teams. Number of attendants per team.

Best and most economical means of cleansing wagons in service. Frequency of cleansing and cost of same.

Most suitable and economical means of conveyance by horse, electric or other power for different conditions of haul.

Advantages and disadvantages of letting the collection of refuse by contract. The essential stipulations for collections by contract.

Advantages and disadvantages for cities of having permanent staff, tools and wagons for collecting refuse.

Most efficient organization for collecting and conveying refuse.

VI. REFUSE DISPOSAL.

Reference to the same classes of material as are given under heading V.

PHYSIOLOGICAL, PATHOLOGICAL AND NUISANCE DATA.

Physiological and pathological effects of feeding pigs with garbage before and after its fermentation has begun.

Sanitary dangers of using night soil, stable manure and street sweepings from cities for farming purposes.

Sanitary dangers and nuisances resulting from incineration of the several classes of refuse with insufficient heat, and from the reduction process with insufficient care and completeness of plant.

Sanitary effects of land making by the dumping of manure, street sweepings, ashes and rubbish. Dust nuisances. Odors from burning.

Sanitary effects of dumping garbage, night soil and rubbish on land or at sea under conditions causing stranding on shores.

ENGINEERING DATA.

Analyses of all the separate classes of refuse, with reference to their disposal, should record all elements required so as to determine for:

(1) Garbage: Value of food for pigs, of grease and fertilizer and of steam from incineration.

(2) Dead Animals: Value of grease and fertilizer and of steam from incineration.

(3) Night Soil: Value of fertilizer and of steam from incineration.

(4) Manure: Value of fertilizer and of steam from incineration, and value for land making.

(5) Street sweepings: Value of fertilizer and of steam from incineration and value for land making.

(6) Ashes: Value of steam from incineration, and value for land making.

(7) Rubbish: Value of pickings and value of steam from incineration.

Calorific values of the several classes of refuse.

Amounts of grease produced per ton from different kinds of garbage and from dead animals.

Amounts of fertilizer produced per ton from the several classes of refuse and their relative commercial value.

Amount of shrinkage from landmaking by manure, street sweepings and ashes.

Time required for the decomposition of garbage, dead animals and night soil, by burial in different soils, at different depths and under different degrees of temperature, moisture and soil porosity.

Utilization of ashes and clinker resulting from the incineration of the several classes of refuse.

Essential characteristics controlling the design and construction of works for incinerating and reducing, and controlling the methods for operating, dumping and feeding the respective kinds of refuse, so that all hygienic requirements are satisfied.

Regulations for operating the works and of conducting the routine of the several methods of refuse disposal, so that all hygienic requirements are satisfied.

Advantages and disadvantages of disposing of the different classes of refuse by contract or by permanently employed city labor.

Most efficient organization for disposing of city refuse.

Cost of the several methods of refuse disposal.

VII. STREET CLEANING.

PATHOLOGICAL AND NUISANCE DATA.

Pathological dangers and nuisances arising from the preventable and unpreventable accumulations of litter, dirt and dust on the pavements of city streets. Sources and analyses of litter, dirt and dust. See Air Supplies.

ENGINEERING DATA.

Average weights of the preventable and unpreventable classes of street surface refuse per cubic yard.

Average quantities of the organic and mineral dirt and also of the dust accumulating on pavements, in weight and volume per thousand square yards of pavement per annum, and also per capita per annum.

Hand sweeping and tools. Efficiency and cost.

Machine sweeping with or without sprinkling attachments to the machines. Efficiency and cost.

Quantity of dust remaining after sweeping the different classes of pavements.

The use of sea water and of mixtures of fresh water with chloride of calcium, chloride of soda and chloride of magnesia etc., for sprinkling streets. Efficiency and cost.

Sprinkling by sprinkling machines. Efficiency and cost.

Quantity of water required per thousand square yards for a single sprinkling.

Cleaning wet surfaces with squeegees. Efficiency and cost.

Flushing by hose, efficiency and cost.

Flushing by wagon, with or without brooming or squeegee attachment. Efficiency and cost.

Quantity of water required per 1,000 square yards for flushing the different classes of pavements.

Relative efficiency of flushing as against sweeping for the removal of the dust.

The use of oils, tars, bitumens and similar oleaginous substances for dust suppression on macadam roads.

Best routine work of continuous cleaning up of manure, paper, food rests, litter, etc. Hand carts, shovels, brooms, etc., for this purpose.

Best routine work of intermittent cleaning up of dirt by sweeping and flushing.

Frequency of and best time for cleaning different classes of streets and of pavements. Night cleaning. Efficiency and cost.

Most suitable and economical means of hauling and removing street dirt by horse, electric or other power, under different conditions as usually found in cities.

Manurial and heat values of collected street sweepings.

The sanding of smooth pavements. Efficiency and cost.

Best methods of snow removal. Efficiency and cost.

Most efficient organization for street cleaning.

Contract labor versus permanently employed city labor.

VIII. RIVER CLEANING.

PATHOLOGICAL AND NUISANCE DATA.

Character of the usual river pollutions, distinguishing between the mal-odorous nuisances and the dangers to health.

Pathological dangers to domestic animals using river water, and to marketable fish and shell fish inhabiting rivers and estuaries objectionably polluted by:

(1) Raw city sewage from separate systems of sewerage.

(2) Rainwater overflows from combined systems of sewerage.

(3) Rainwater washings from built up city territory having all domestic sewage excluded by interception and dealt with separately.

(4) Rainwater washings from agricultural territory receiving manure.

(5) Tradewastes injurious to animal and fish life.

(6) Boat travel and vessels cleaning up in harbors.

Degrees of dilution and other conditions practically eliminating the pathological dangers from the above mentioned six causes.

Conditions for the survival of pathogenic bacteria, as affected by dilution, in flowing and in ponded or lake waters; also in brackish and salt waters.

Conditions in fresh, brackish and salt waters for the survival of pathogenic bacteria when these are contained in the mud usually deposited from such waters in river beds and along the shores.

Financial value of maintaining clean rivers from the standpoint of health.

PHYSICAL, CHEMICAL AND BIOLOGICAL DATA.

Unpreventable and therefore permissible degrees of river pollution resulting from the natural conditions following increased population and industries.

Best means of expressing, physically, chemically, bacteriologically and by its plankton, the conditions for an acceptably clean river and an objectionably polluted river, and considering the usual but different river conditions found in civilized communities.

Purpose and value of knowing the amount of dissolved oxygen in waters to indicate the degree of their pollution. Relation of various kinds and degrees of pollution to the amounts of dissolved oxygen.

Purpose and value of determining the content of organic and mineral matters, both dissolved and suspended, to express the degree of river pollution.

Purpose and value of determining the ammonias to indicate the degree of pollution. The most useful forms in which they should be presented.

Purpose and value of determining the bacterial and plankton content of river waters. Means of discriminating between the various species and varieties, which may be injurious to health or simply cause of nuisance and those which on the other hand are beneficial in reducing the quantity of organic matter.

Purpose and value of determining the composition of muds and other deposits in relation to river, pond or bay pollutions.

Value of fish and shell fish in effecting a removal of organic matter from rivers, by using it as food.

Injury to fish and shell fish, that may arise from surface washings of rain water, from city sewage and from trade wastes entering rivers.

ENGINEERING, LEGAL AND FINANCIAL DATA.

Practicable degrees of protecting river waters, not used for potable purposes, from preventable pollution, in the interest of agriculture, of fish life and of manufacture.

Best treatment of river waters, unpreventably polluted, when used for various agricultural purposes.

Best treatment of river waters, unpreventably polluted, when used for various manufacturing purposes.

Sewage sludge interception on land.

Relation of frequent sludge dredging from the river bottoms in preventing excessive reduction in the dissolved oxygen in the river water.

Reasonable rights of riparian owners for protection against river pollution.

Just and practicable legislation regarding river pollution.

Control by national, state and drainage district authorities of preventable rivers pollution.

Means and cost of cleaning river bottoms by periodical sludge removal.

Means and cost of cleaning polluted river water for agricultural purposes.

Means and cost of securing a prevention of pollution or a cleaning of the waters of rivers and estuaries to a degree making it safe to allow of the taking of food fish and shell fish therefrom.

Financial aspects of restricting the various causes of both preventable and unpreventable river pollution, as against purifying river waters for potable supplies and agricultural purposes, and against abandoning within such water the taking of fish and shell fish used for food.

Financial value of clean rivers from the standpoint of public decency.

TYPHOID FEVER IN RURAL VIRGINIA
A PRELIMINARY REPORT

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Read before the American Public Health Association, Havana, Cuba, December, 1911.

There is no more interesting chapter in the history of sanitary science than that devoted to the development of our ideas regarding the cause and transmission of typhoid fever. Confused as the disease was until about the middle of the last century with typhus fever, the differentiation of the two left the cause of typhoid fever still unknown. Real work in connection with its transmission thus began with the recognition of the disease as a clinical entity.

It was early evident in the study of typhoid fever that filth, particularly filth from human bodies had a large share in the causation of outbreaks. It was likewise recognized that water and milk polluted with human filth sometimes caused widespread epidemics of the disease. These facts seem to have been accepted by most of the early students of typhoid, but most of the sanitarians of the middle of the last century denied the contagiousness of the disease. Murchison formulated a theory of the causation of typhoid to fit these beliefs. He taught that the disease was pythogenic, or bred in filth, that the virus was spontaneously generated in decomposing organic matter and was given off in an effluvium of malaria. He later modified this theory by ackowledging the contagious element in the disease, but still contended that the contagion from a case had to develop or breed in filth before infecting others.

Murchison's ideas were generally accepted by the sanitary world and prevailed until the year 1873 when Budd* published his wonderful series of observations on the spread of the disease and his conclusions from them. Budd's work, begun long before the days of the germ theory or even Listerism, was continued with the publication of occasional papers on the subject, from 1850 to the time of the publication of his complete monograph in 1873. In many respects this monograph on typhoid fever is the most remarkable document ever produced on the subject. Working as a practitioner in the rural districts of England, with only his own personal observations and reason to guide him, he produced a work which lacks but little of telling the whole story of the transmission of typhoid fever even today. Budd's conclusions, which he supports by full and complete epidemiological evidence, are as follows:

1. That typhoid fever is, in its essence, a contagious, or self-propagating

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*Typhoid Fever, William Budd, London, 1873.

fever, and is a member of the great natural family of contagious fevers, of which smallpox may be taken to be the type.

2. That the living body of the infected man is the soil in which the specific poison, which is the cause of the fever, breeds and multiplies.

3. That the reproduction of this poison in the infected body, and the disturbance attaching to it constitute the fever.

4. That this reproduction is the same in kind as that of which we have, in smallpox, ocular demonstration.

5. That the disease of the intestine, which is its distinctive anatomical mark, is the specific eruption of the fever, and bears the same pathological relation to it which the smallpox eruption bears to smallpox.

6. That, as might have been anticipated from this view, the contagious matter by which the fever is propagated is cast off, chiefly, in the discharges from the diseased intestine.

7. That as a necessary result, sewers and the cloacæ which, under existing sanitary arrangements, are the common receptacles of these discharges are, also, the principal instruments in the transmission of the contagion; and, consequently, that, in many instances, the infected sewer, and not the infected man, appears as if it were the primary source of the specific poison.

8. That once cast off by the intestine this poison may communicate the fever to other persons in two principal ways—either by contaminating the drinking water, or by infecting the air.

9. That, as an inevitable consequence of the impalpable minuteness of the contagious unit, and the many invisible and untraceable ways in which it is transmitted, cases must be constantly occurring, exactly as in the other contagious fever whose linear descent cannot be followed, and which spring up, therefore, under the semblance of spontaneous origin.

10. That the occurrence of such cases obviously constitutes no proof, whatever, that this fever ever does arise spontaneously.

11. That the exceeding specialty of the conditions attaching to the reproduction of the specific poison in the living body itself, as well as the facts relating to the geographical distribution, past and present, of this and the other contagious fevers, constitute evidence as strong as such evidence can ever be, that none of these fevers originate spontaneously, but are propagated solely by the law of continuous succession.

The work of Budd effectually and completely overturned most of the accepted notions of the sanitarian of his day, and put the study of the disease on a sure basis. Within a decade his views were confirmed, and extended by the discovery of the specific, the bacterial cause of the disease. Sanitarians at once began to study the disease and to attempt prevention.

Notwithstanding that Budd pointed out the fact that studies of typhoid fever can best be conducted in the rural districts where "the population is thin and the lines of intercourse are few and always easily traced." practically all of the early work in connection with the transmission and prevention of the disease which followed the discovery of typhoid bacillus was done in the cities. The epidemics studied were usually in cities, and most frequently in those in the more northern latitudes. These epidemics were most frequently found be to due to an infection of the water supply . In the same way cities suffering from unusually high death rate from typhoid fever became the subject of investigation and prevention and here too, the water supply was usually at fault. The brilliant results which followed the installation of purification systems, bringing about an immediate and usually a most significant reduction in the typhoid death rate affected most profoundly the minds of sanitarians and people alike. The sanitary engineer and the water bacteriologist became the central figures in typhoid prevention and the problems of the cities, and usually the northern cities, attracted most of the attention directed to typhoid fever. It was thought and publicly stated that any city suffering from a typhoid rate of 20 per 100,000, the so-called residual rate, was using a polluted water. The rapid extension of sewerage systems, dictated as it was by reasons of decency, convenience and esthetics, attracted but little attention. It was treated as a matter of course, and as this extension usually took place in small units, its results at any one time were not sufficiently striking to attract attention. Typhoid infection by the pollution of drinking water became firmly intrenched in the public and sanitary mind as the great cause of the disease, far overshadowing all others.

The first serious setback to this state of mind came with the researches of the Typhoid Fever Board of the United States Army into the causes of typhoid fever in army camps during the Spanish-American War. The results of these studies are, of course, well known to us all.

Additional evidence of the influence of factors other than water in the transmission of typhoid fever was obtained when the water filtration plant at Washington, D. C., though of the most modern and approved type, built and operated almost without regard to expense, failed to make any appreciable reduction in the rather excessive prevalence of typhoid fever in the city of Washington. It was concluded from this that the purification effected by long storage had largely eliminated infection of the water and that other causes must be sought to explain the high prevalence of the disease in Washington. The investigation by the board appointed to study the question showed conclusively that many factors combined to cause a high typhoid death rate in Washington in spite of the fact that the water supply, according to accepted bacteriological standards, was of excellent quality.

Coincident with this work an investigation of typhoid fever in Richmond, begun, in the year 1907 and reported at the meeting of this Association in 1908, by Dr. E. C. Levy and one of the authors, called attention to the remarkable parallelism between the typhoid rates of Richmond, Virginia, and Washington for the period for which statistics are available, and stated the conclusion of the authors that water was not a considerable factor in the high typhoid rate of Richmond. The conclusions of this paper were supplemented by recommendations for the control of typhoid fever in Richmond, Virginia. These were carried into effect the following year, and without change in the water supply, resulted in a reduction of the typhoid rate of Richmond from 49.7 per 100,000 in 1908 to 24.1 per 100,000 in 1909. This reduction has been maintained,—the rate for the 1910 year being 21.9 per 100,000,—the rate for 1911 will in all probability be still lower.

These results indicated that in the cities and army camps of the South at least certain factors other than polluted water were operative in the spread of typhoid fever, and that these factors either did not exist to the same degree or had not been recognized in these cities further north in which similar studies had been conducted.

In our work in the cities, therefore, we have reached middle ground, recognizing the great influence of water in the causation of epidemic typhoid fever, and as a factor in the causation of the continuously high typhoid rates of certain cities, but recognizing also that even after a pure water is secured, a certain typhoid death rate remains, varying in amount with the climate and demanding for its reduction a systematic and intensive campaign to secure the isolation of the patient and, equally as important, the proper disposal of human excrement in the community.

It cannot be said that we have reached similarly satisfactory ground in connection with the typhoid fever of rural districts. As has been pointed out, most of the work in connection with the transmission of typhoid fever has been done in the cities. The rural districts have been almost entirely neglected in our studies as well as in our efforts at prevention. Since the days of Budd, no careful and intensive studies of typhoid fever in rural districts were made up to the time the work of Koch and his assistants in southwest Germany, published in 1903. This work has received but little attention in the United States and references to it in our literature are few and scattered. By this work, Koch demonstrated that with modern laboratory forces at one's disposal, and with practically unlimited money and equipment, it is possible to practically free a heavily infected rural district of typhoid fever. We have not yet faced and solved the problem of freeing a country district of typhoid fever by using the ordinary means available to the sanitarian in his daily work.

Typhoid fever of the rural districts is today the greatest problem of sanitation in the United States. As was pointed out by Fulton in 1903, the death rate from typhoid fever by states varies almost in proportion to the percentage of rural population. Those states which have the highest percentage of rural population have by far the highest death rates from typhoid fever. In practically every rural district of the United States the disease prevails year after year, often causing death rates that for a city would attract attention and condemnation from the whole country. The rural districts surrounding any of the cities of the United States are veritable reservoirs of infection and real typhoid prevention cannot be accomplished unless they are to receive their due share of attention in our campaign.

On the organization of the State Health Department of Virginia in July, 1908, the problem of rural typhoid fever at once claimed attention and work was at once started in connection with it. It was early evident in the work that the knowledge available to us at that time regarding the transmission of typhoid fever in rural districts did not suffice to explain our findings. Systematic study was absolutely essential. With this end in view, one of the writers began an investigation of typhoid fever in the rural districts of Virginia in the summer of 1909, and in the summer of 1910 a student investigator was put to work at the problem under our supervision. The results were so promising that the authors under the joint auspices of the Virginia State Health Department and the United States Public Health and Marine Hospital Service, began during the summer of 1911 a further investigation of the prevalence of typhoid fever in the rural districts of Virginia. This report is a preliminary statement of the general plan of the investigation and a provisional report on the findings of the first summer's work.

Prevalence of Typhoid Fever in Rural Virginia.

There is no effective machinery for the registration of vital statistics in Virginia. A system of voluntary reports, received monthly from considerably more than one half the physicians of the state gives the only index of the prevalence of typhoid fever in the state. Eliminating the cities from consideration, the estimates of the State Health Department, there were in 1909, 14,065 cases of typhoid fever in Virginia,—in 1910, 11,843, and 1911, 11,803 cases. The death rate is probably about 50 per 100,000 per annum.

Chronological Distribution.

The chronological distribution is shown on the accompanying charts. Chart number 1 shows the relation of the average monthly mean air temperature at Richmond, Virginia to the three year monthly average number of cases of typhoid fever to the average monthly mean air temperature. Chart number 2 shows the relation of the number of cases of typhoid each month for the three years to the average mean temperature of that month at Richmond, Virginia. As will be seen the typhoid curve follows regularly the changes in the temperature curve.

Methods of Study.

The method of study employed during the course of the investigation was exceedingly simple. Visit was made to the county by the investigators. Each physician in the territory was seen personally and all cases diagnosed by him during the current year were listed. In this way practically all cases of typhoid fever which had been recognized as such by a physician were obtained. The infected houses were then visited and the usual epidemiological data collected. This information was carefully tabulated and studied and such additional investigations as were indicated were then carried on.

Results of the Investigation.

It is impossible in a paper of this character to discuss in detail the various counties which were studied and the results of the studies. Three typical outbreaks illustrative of the whole will be cited and the conclusions of the investigators stated.

Westmoreland County.

The outbreak of typhoid fever occurring in Westmoreland County in the years of 1908 1910 was of great interest by reason of the fact that prior to the outbreak the infected territory has been practically free from the disease for at least ten years. A few scattered cases had appeared but there had been no general spread until the time under consideration.

Westmoreland County lies in the territory known as the Northern Neck of Virginia. It is a low sandy penninsula between the tidal estuaries of the Rappahannock and Potomac Rivers. Westmoreland lies on the north side of the peninsula, next to the Potomac. The land is exceedingly flat, uniform in character, being almost entirely a sandy loam or sandy clay. The negro population is large. The county had an area of 245 square miles and a population of 9,313 in 1910.

The general sanitary conditions of the country are bad. Many of the houses are not supplied with any privy whatever, promiscuous soil pollution being common. The privies where existing are of the open back surface type. Human filth is undoubtedly widely disseminated in the community. The water supplies are about on a par with those of the average country neighorhood. Artesian water of excellent quality can be had at a depth of about two hundred feet and is in use in many homes. Shallow wells are in common use. These wells yield a water of excellent quality when protected against pollution around the top, but most of those seen were not so protected.

The epidemic began at McGuire's wharf with a case which developed upon the return of the patient who had been on a visit of several weeks to Washington, D. C, and who was taken sick immediately upon her return. This was in July 1908. A colored cook living in the neighborhood visited this first case while cooking and helped one day in the nursing. Eight days subsequent to this, the cook was taken sick, with headache and fever, but lost only one day from her work as a cook in a neighboring family. Several days later, after her return to work she took part in the preparation of a basket of lunch for a Confederate reunion which was to be held in the neighborhood, on September 24th, 1908. Fourteen persons ate of this lunch prepared by the cook in question, and of these seven developed typhoid fever almost simultaneously within five to seven days after the reunion. These persons had not previously been together and had eaten nothing in common except from the basket. The particular dish to which suspicion attached was one of cold lamb which was sliced by the cook and of which

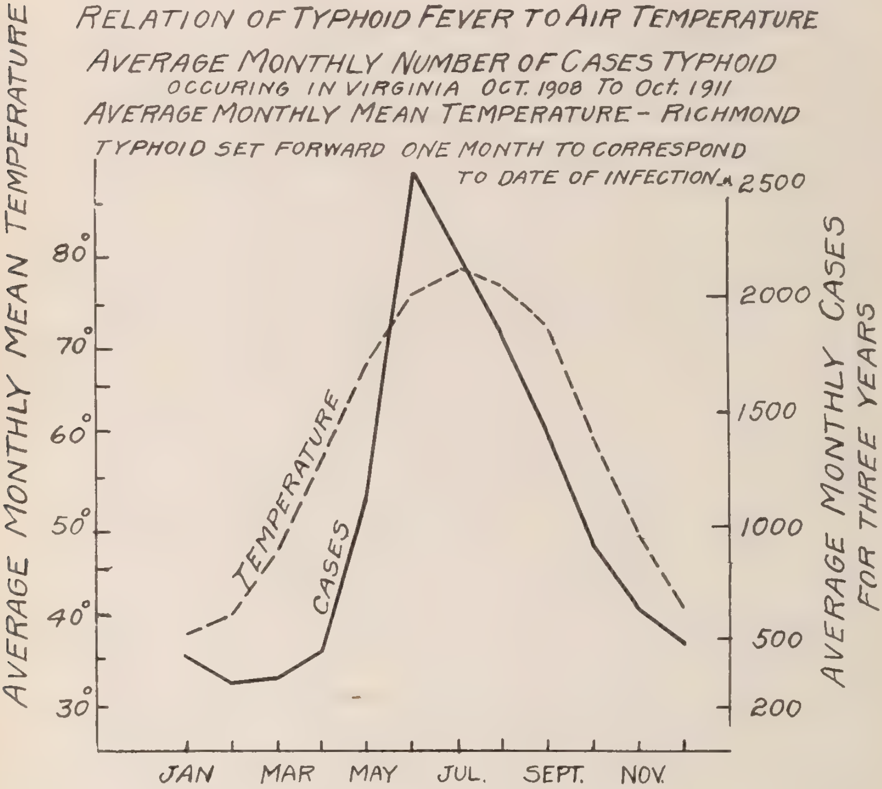

CHART A.

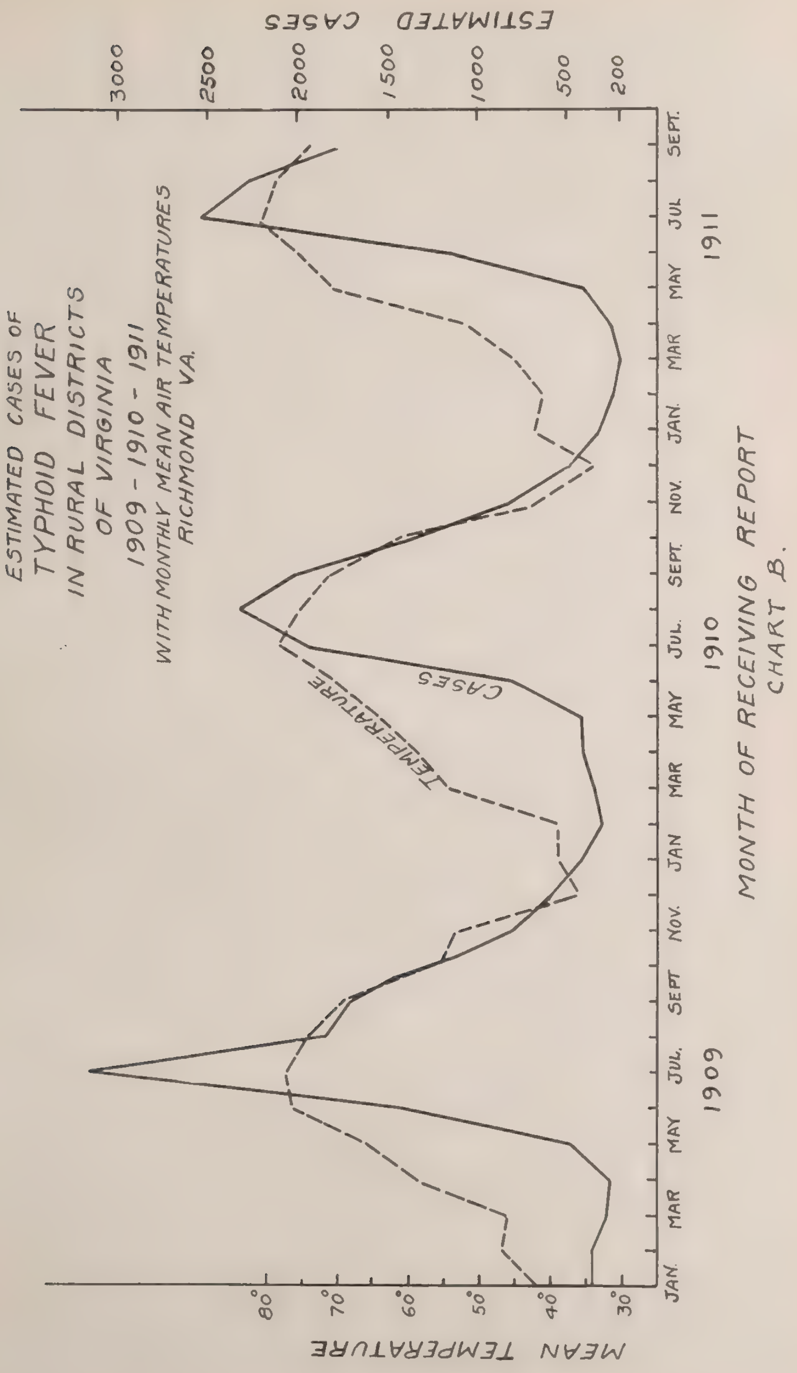
ESTIMATED CASES OF
TYPHOID FEVER
IN RURAL DISTRICTS
OF VIRGINIA
1909 - 1910 - 1911
WITH MONTHLY MEAN AIR TEMPERATURES
RICHMOND VA.
ESTIMATED CASES
3000
2500
2000
1500
1000
500
200
MEAN TEMPERATURE
80°
70°
60°
50°
40°
30°
JAN.
MAR
MAY
JUL.
SEPT
NOV.
JAN
MAR
MAY
JUL.
SEPT.
NOV.
JAN.
MAR
MAY
JUL
SEPT.
1909
1910
1911
CASES
TEMPERATURE
MONTH OF RECEIVING REPORT

CHART B.

all had eaten who developed typhoid. In addition, one other person who was not at the reunion, but to whom some of this same lamb was sent, developed the disease.

This first outbreak established the disease at a number of points throughout the county and it spread rapidly throughout the winter. The lines of spread could be followed in many cases during the succeeding winter with great ease. Persons who helped nurse patients returned home to develop the disease and in turn infected their own families. Various foods seemed to be at one time or another responsible for the carriage of the infection. In one case the only connecting link between the cases seemed to be an orange which was taken from the sick room and carried to a little girl, who upon eating it developed the disease.

Of the sixty-one cases comprising the epidemic, practically all could be accounted for through direct contact, or through interchange of food products.

Moreover, oysters undoubtedly played an important role in the spread of the disease during the winter months. For example: Mr. A. bought some oysters from Mr. K. and served them on Sunday morning. Mr. A.'s family consisted of eleven persons, of whom only himself and three children ate the oysters. All four of these persons developed typhoid within three weeks, three developing it simultaneously. None of the other seven in the family developed the disease.

Mr. D. bought some of the same lot of oysters, and on the same day his son ate some of them raw. The other members of the family ate them only after cooking. Ten days later this son developed the disease. The other members escaped.

On March 13th Rev. G. bought some oysters from Mr. K. Rev. G. was the only person who ate these oysters raw and two weeks later he developed typhoid fever.

On December 1, 1909, Dr. C. purchased oysters from Mr. K. Those were served on that day to the family. In the house there were ten persons but only three of them ate the oysters raw.

Typhoid developed ten days later in all three, almost simultaneously.

These oysters came from a small creek which was heavily polluted, and on the banks of which were located, at the time of these outbreaks, several cases of the disease.

While foods other than water seemed responsible for many cases, no evidence was obtained on careful study to show that infection of water had any large influence on the transmission of the disease.

Lee County.

In June 1911, one of us investigated an outbreak of typhoid fever in Lee County, Virginia. Lee county lies in the extreme southwestern end of the State and is almost entirely mountainous. It has an area of 433 square miles and a population of 23,840. In the neighborhood in which the outbreak occurred the population is practically all white. The people are typical Alleghany mountaineers living in their small cabins in the valleys between the steep mountain sides and having but little intercourse with the rest of the world. Prior to this outbreak, the neighborhood had been entirely free from typhoid infection for at least twenty years. There is no physician within twenty miles, but the people could not recall a single case of typhoid in that time.

Sanitary conditions in the neighborhood are exceedingly primitive. There are no privies, soil pollution is common. The water supplies are excellent. The country is underlaid with sandstone which outcrops some distance above the bed of the small creek. The mountains above are almost perpendicular and absolutely uninhabited. Along the outcrop are a large number of small springs, practically unfailing, always clear and cold.

Only one of the springs seen in the course of the investigation showed any reasonable possibility of pollution. The health of the inhabitants of the valley is normally excellent.

The outbreak began in December 1910 with a girl who had been for several months visiting in an adjoining county of Tennessee. She returned home ill and was seen only once by a physician who drove twenty miles into the mountains for the purpose. Following her case, six other cases developed in the family, at intervals of about two weeks. The disease then spread throughout the valley, practically every house in the settlement being infected.

Of the eleven houses infected subsequent to the first case, in four the first case was in the person of some one who had been to the first house and aided in the nursing. In two other infected houses the first case was in the person of some one who had aided in nursing the cases in the second group. In all there were seventeen cases among persons who had been in intimate personal contact with the previous cases of the disease. Another factor appeared in the middle of the outbreak. At the house first infected no precautions whatever were taken with the excreta of the patients. The stools were carried about fifty yards and emptied back of the barn. The urine was emptied from the porch into the yard. The yard slopes markedly and at the foot of the slope is the spring. Leading from the corner of the porch to the spring is a well defined wash and at the corner of the spring wall there was an opening several inches in diameter, and within the spring itself a pile of sand which had been washed down from the yard. The spring was undoubtedly infected at every rain. The water from this spring was used by the family and was also used at a church nearby as well as at the public school. In four houses the first cases were in those who had attended meetings at the church and had drunk this well water. There were six cases secondary to these first cases. In one house the first case was infected at the school. Three secondary cases developed in this house. No other of the school children were infected.

Other factors which might have been responsible for the transmission of the disease were entirely negative.

The accompanying chart shows graphically the apparent lines of transmission.

Grayson County.

A large number of cases of typhoid being reported from a neighborhood in Grayson County, Virginia, during the month of August, the authors visited the neighborhood and made an investigation of the conditions. Grayson County lies in a high plateau between the ranges of the Blue Ridge mountains. It is a prosperous community, the land being fertile and productive. The infected neighborhood, Elk Creek Valley, is one of the most beautiful and prosperous agricultural communities of the State.

The Elk Creek valley has been practically free from typhoid fever for many years. The present physician has been practicing in the neighborhood for forty years and succeeded his father and grandfather in the same place. He states that this is the first time in at least twenty years in which he has had more than one or two cases of the disease. About six years ago, the disease appeared in the Eastern end of the county and has been gradually working westward, each summer seeing cases further to the westward. The progress of the disease has been against the flow of the Elk Creek which drains almost the entire community.

The first case of the present year appeared on May 28th. The patient had been working with a saw mill crew during the winter and on the farm where the mill was located in May there had been typhoid the previous year. He had been in contact with no known case of the disease. Following this case, twenty cases occurred in the neighborhood, occurring in thirteen families. These cases were scattered throughout the neighborhood, there being no tendency to grouping. Of the twenty cases only four had been in demonstrable contact with previous known cases of typhoid fever direct or indirect.

The water supplies of the territory are excellent. The geological formation is sandstone and granite and the soils are almost all heavy clays. The springs usually arise on the slopes of the mountains, frequently some distance above the habitation. None showed any signs of pollution.

No interchange of milk or other foods could be demonstrated. The country is peculiar in that the inhabitants produce almost everything they use. The stores of the neighborhood handle heavy groceries exclusively, and there was no indication whatever of the influence of any food on the spread of the disease.

The outbreak was absolutely inexplicable on the ordinary theories of water, food or contact transmission. The distances between the infected houses would argue against the fly as the transmitting agent. The investigators were struck, however, with the large numbers of persons who had had mild febrile disturbances during the period of the outbreak. In almost every house where recognized cases occurred there were other febrile disturbances, usually clearing up in a few days, and not diagnosed as typhoid. The cases occurred in many other persons at homes where no typical cases of typhoid developed. It was impossible to secure blood specimens from these persons for examination except in two cases. Both of these cases, who were in close contact with recognized cases of typhoid fever, gave positive Widal reactions in dilutions of 1 to 100. Neither had any history of having had typhoid fever previous to the present summer.

The findings of these three investigations are typical of the whole series. The widest diversity of factors seemed to be dominant in the spread of the disease at one time or another, but all were present to a greater or less degree in all. The most striking single fact in the investigation is the inability in most cases to discover any evidence indicating that water is a factor of any great importance in the transmission of the disease during the summer months. In rural and small community outbreaks of the winter months, it is quite common to find evidence pointing to some well, spring or other small water supply. In the summer cases it is quite rare to find such evidence.

The following conclusions are offered by the writers as a result of the first summer's joint work in connection with the study of rural typhoid fever in Virginia:

1. Typhoid fever of the rural districts of Virginia is largely a matter of the summer months, appearing quite regularly at the beginning of June and ending usually about the middle of September.

2. In the winter months, localized waterborne outbreaks of the disease sometimes occur.

3. In the summer months the influence of water in the transmission of the disease is not apparently of great importance.

4. Direct personal contact with the sick, particularly in those nursing the patients is an important means of spread of the disease.

5. Milk and foods of various kinds coming from infected houses frequently carry the infection.

6. General dissemination of human feces, particularly by the fly and on the feet of fowls and domestic animals is an important means of spread.

7. Mild cases of typhoid infection, clinically unrecognizable, serve frequently as distributors of the infection. Such cases probably occur in considerable numbers wherever typhoid is prevailing.

The prevention of typhoid fever in the rural districts of Virginia, while a matter of great difficulty and of necessity requiring many years for its accomplishment, rests, we believe, on the following simple elements.

1. The general education of the people as to the nature and means of spread of the disease, particularly as to the dangers of contact and food infection.

2. The isolation of the sick and the disinfection of the excreta together with the bed and body linen.

3. Recognition of human excrement as the most dangerous material on the farm, and so providing for its care and disposal that it be kept off the ground, in a water tight receptacle, screened against flies and animals, until burned, disinfected, buried or otherwise safely disposed of.

The recognition of human filth as the source of the infection, and the avoidance of all fecal contamination, whether by flies, food, clothing, hands, water, or any other means whatever, constitutes the one and only precaution necessary for the absolute prevention of the disease.

THE NORTH CAROLINA CAMPAIGN AGAINST HOOKWORM DISEASE

JOHN A. FERRELL,

Asst. Secy. to the N. C. State Board of Health for the Eradication of Hookworm Disease, Raleigh, N. C.

Read before the American Public Health Association, Havana, Cuba, December, 1911.

The North Carolina Campaign against Hookworm Disease represents only an integral part of the general campaign which is being conducted by the co-operation of the Rockefeller Sanitary Commission and the State Boards of Health in the Southern States. The State work was formally inaugurated when by the joint action of the Rockefeller Sanitary Commission and the State Board of Health the writer was selected as State Director of the campiagn and titled Assistant Secretary for Hookworm Disease. The duties of the position were assumed March 12, 1910.

The plan adopted for beginning the work embraced:—

(1) The determination of the geographical distribution of the disease and the approximate extent of its prevalence by counties.

(2) The employment of all available agencies to get the present sufferers cured.

(3) The bringing about of those sanitary reforms necessary to stop soil pollution and thus prevent the further spread of the disease.

In the organization of the forces to prosecute the plan outlined above, we found that the work would have to be executed by three sets of workers, to wit, those in the central office, those in the laboratory, and those in the field. The central office work has been handled by the State Director and a clerk, with occasional clerical help; the laboratory work by microscopists whose number has increased as needs demanded until now eight men give their entire time to the work. They are nominated by the State Director of the Laboratory and when engaged in the Laboratory are supervised by him. The field work is intrusted to physicians, as District Directors, who devote their entire time to the campaign.

The work accomplished during the twenty-one months our campaign has been in progress may, for convenience of description, be considered in periods distinguished one from another by the predominating character of the work pursued.

The first period, dating from March 12th to July 1, 1910, was consumed in collecting data pertaining to the distribution and frequency of the disease in the State and the experience of the State's physicians in treating it; in securing field assistants; outlining a plan of work; preparing literature for circularizing the State; and in securing the co-operation of the medical profession, the press, and the educational forces.

In collecting data the result of the microscopic examination of six hundred college students, representing seventy-eight of the ninety-eight counties of the State taken at random, was obtained by having specimens furnished by the students examined in the State Laboratory of Hygiene. One-third of this number, residents of fifty-four counties were infected. Letters of inquiry to the nearly 2000 physicians of the State concerning their experience with the disease were sent out. Three hundred and fifty replied, and of this number one hundred and eighty-three had treated approximately 3,200 cases. Thus was obtained in a general way the distribution and prevalence of the disease during this first period. In subsequent periods more than one thousand orphans, more than one thousand militiamen, and approximately twenty thousand school children, all taken at random, were similarly examined microscopically and the results recorded by counties. Moreover, more than one-third of the physicians in the State have now treated the disease and given us the benefit of their observations and experience. The results of this investigation therefore afford reliable data for indicating the distribution and prevalence of the disease. In ninety-nine of the one hundred counties of the State the disease is now known to be more or less prevalent.

The second period covers July and August of 1910, and was principally devoted to reaching doctors and public school teachers, and to having examinations made of the State militiamen by regiments during the encampments, and of children in the various orphanages of the State. Three splendid physicians, especially equipped for the work undertaken, entered the service in July, and devoted their time chiefly to reaching sixty county teachers' institutes, attendance on which by the teachers is required by law. At each institute lectures on the disease were delivered, the worms exhibited, the ova demonstrated with the microscope, and the essentials and value of sanitary privies emphasized. Doctors were interviewed and urged to join in the work. During this period, too, much progress was made on the infection survey, and approximately 4,300 teachers and a large number of physicians, editors and laymen were acquainted with the work. Through the mails, our Field Physicians, teachers and superintendents of education, our literature and circular letters were beginning to find their way into every county of the State. This general line of work was pursued until the public schools began to open in September.

The third period of the campaign corresponds in time with the scholastic year beginning in September, 1910, and ending in June, 1911. During this time each Field Physician, working with and through physicians and teachers, endeavored to reach the children in the schoolroom and through the children the patrons. Besides lecturing to the school, the Field

Physicians would leave fecal containers and literature with the children to be carried home, with instructions that on the following day a specimen of feces be brought to be forwarded to the Laboratory. Splendid coöperation on every hand was had in the work. In going from school to school, note was taken of the sanitary conditions found at the schools, churches and especially the homes.

With the information thus obtained sanitary and infection surveys have been made. The sanitary survey is based on the average sanitary value of the privies found at not less than one hundred rural homes in a county taken at random, each type of privy to be found having a fixed sanitary value expressed in percentages. The infection survey is based on the microscopic examination of not less than two hundred rural school children, ages six to eighteen, inclusive, taken at random for each county. Sanitary surveys have been completed in 45 counties, and in 23 of them the infection surveys have been completed.

With the beginning of this period the State, then composed of ninety-eight counties (now one hundred), was divided for convenience in distributing territory to the Field Physicians into nineteen sanitary districts. To Dr. C. F. Strosnider was assigned Dist. No. 6, composed of five eastern counties in the Tidewater section; to Dr. B. W. Page Dist. No. 12, made up of five central counties in the Piedmont section, and to Dr. C. L. Pridgen Dist. No. 16, embracing five western counties in the mountain section. With this distribution of workers a thorough knowledge relative to the disease in the three geographical sections of the State was obtained.

May and June of this period represent something of a transition from the schoolroom work previously pursued to that being followed at present. It was used to reach a number of schools and teachers' institutes, and in making infection and sanitary surveys in counties taken at random. On May 1st, Dr. P. W. Covington entered the service as a Field Director, and, like the other three physicians, industriously applied himself to the work in hand.

The fourth and present period dates from July 1st, and has been characterized by the operation of state and county dispensaries for the free examination and treatment of the disease. The dispensaries were successfully operated first by the Porto-Rican Anemia Commission, and later, during the present year, in Mississippi and Alabama gave highly satisfactory results. In North Carolina since July their operation has been marked by splendid accomplishments.

To begin this phase of the work, the counties of Robeson, Sampson, Columbus and Halifax, all in the eastern part of the State, where the infection is heaviest, were assigned to Drs. Page, Stronsider, Pridgen and Covington respectively. Each man set to work to secure the written endorsement for the proposed work of the County Boards of Health and of Education, the County Superintendents of Health and of Schools, and of every practicing physician in the county. These endorsements were presented to the Board of County Commissioners with a request that it make an appropriation of from $200 to $300 to be used in defraying the costs of drugs, publicity work, and the traveling expenses of a microscopist to assist the physician in charge. Each man secured his appropriation, and soon the dispensaries were opened. They were made popular, and during the first thirty dispensary days 12,500 treatments were administered. The commissioners and other authorities of nearby counties were invited to investigate by visiting, or otherwise, the dispensary work. They were impressed, because with moderate effort twenty-five counties (see map) have now made provision for having the free dispensaries.

The latter part of September, Dr. T. E. Hughes entered the service. He and three microscopists are paid out of a $5,000 appropriation secured from the State for the campaign. Consequently dispensaries are now simultaneously operated in series of five counties, instead of four. Up to this time the dispensary work has been completed in thirteen counties, is in operation in five counties, and there are now on the waiting list seven counties.

The dispensary work is conducted in the following manner: Five widely separated points in a county are selected. At each point an available building, usually a public schoolhouse, is secured for the dispensary. On advertised days of the week the Field Physician and his microscopist spend at least six hours at each dispensary. On corresponding days of the four to six subsequent weeks that the county work continues the dispensaries are similarly opened. Thus people in every section of the county are afforded an opportunity weekly for examination and treatment until the number of successive treatments needed to effect cures have been received. The people assembling at the dispensaries, in addition to being examined and treated, are lectured to and supplied with pamphlets on the disease and the sanitary privy.

The masses of the people are thus educated to know the importance of the disease, its recognition, cure and prevention by actual demonstration. They bring in specimens of feces, see the examination made, and perhaps recognize the ova, see the worms after treatment, and as a result of the cure undergo marked transformation in their physical and mental conditions. In short, the sufferers are being cured and the right kind of public sentiment is being created to put an end to soil pollution and other unsanitary practices. After the dispensaries are running it is not unusual to treat on the average one hundred people daily at each dispensary. In some counties the boards of education have passed orders for the building of sanitary privies at all public schoolhouses. These where available, are pointed out to the people as models, and they are encouraged to build and use them at their homes.

The foregoing description has emphasized those activities which have characterized each of the four periods of our campaign. Our efforts have by no means solely confined to them. Time will not permit an account of many interesting phases and incidents of our endeavors. I trust, however, that a brief general summary of what our daily records show may convey some idea of the entire scope of the work.

Of the 1,879 physicians in the State 1,290 have been interviewed; 1176 have given written accounts of their experience with the disease; 702 have circulated literature concerning it; and 816 of them have reported treating 24,315 cases of the disease. These, added to the 22,333 cases treated since July 1st in dispensaries, total 46,648 treated cases.

The State Association of County Superintendents of Schools has formally endorsed our work, probably three-fourths of the 10,000 public school teachers have received our literature; 8000 of them have been lectured to; 700 schools have been visited, and approximately 25,000 school children have been microscopically examined.

Short articles have been supplied to each of the two hundred and twenty newspapers at intervals of one to three weeks, and have generally been published. In counties having the dispensaries, illustrated pages have been published, and posters and handbills broadcasted.

Approximately 22,355 circular and personal letters and 224,179 bulletins, pamphlets and leaflets have been distributed.

The types of privies at 15,500 homes, 1050 schoolhouses and 500 churches have been inspected, supplying complete sanitary surveys in 4 counties.

One hundred eighty public lectures have been delivered to about 19,592 people; 36,387 people have had microscopic examinations for the infection made. Since July 1st, in round numbers, $600 worth of thymol at wholesale prices has been dispensed.

The county superintendents of health are beginning to devote more time to this disease and to the general medical inspection of school children, and to the sanitary inspection of school premises.

In short, the people are having their eyes opened. They are beginning to appreicate the meaning of the disease, and are actively joining in the warfare against it. They realize that the success of the campaign means more than the eradication of a single disease. Skepticism and squeamishness are rapidly disappearing. Backed by this evidence we are convinced, even though the duration of our campaign is not to be numbered in days or months, that sufficient momentum has already been gained to insure the rapid and final eradication of hookworm disease.

Discussion.

Dr. Freeman:—The Campaign against Hookworm Disease, of which Dr. Ferrell has given so interesting a summary of the work in North Carolina, is one of the most important sanitary moves in the United States today. This work is being carried on along the same general lines in ten of the Southern states at the present time. Each State has a State Director who gives his whole time to the work and each of the Directors is assisted by a corps of District Inspectors who also give their entire time to the sanitary work. These men are in the field constantly in this campaign and constitute a force which for unity of purpose, energy and efficiency are without equal in sanitary effort. There are two great things to be performed in the campaign. The first is the discovery and treatment of the cases of the disease. This work has met with wonderful success and more than 100,000 cases of hookworm have been treated during the past year. The second part of the work to prevent reinfection depends, of course, on sanitary education, and this campaign too, has been carried on with the greatest enthusiasm and energy.

It should be borne in mind that this is the first real work in connection with sanitation in rural districts ever undertaken in the United States. The success which is attending the effort should be a source of great encouragement to all who are interested in the fundamental and important question of rural sanitation.

Dr. Claude A. Smith. I was very much impressed with the statement of the essayist that the diagnosis of hookworm disease was made in North Carolina by the use of the microscope. A great deal of harm has been done in the past by the attempts of physicians throughout the South to diagnose the disease by inspection. The result has been that thymol and other poisonous doses have been administered to patients who were not infected with hookworm, but who were anemic from other causes. The majority of cases of hookworm disease *can not* be detected by simple inspection, and, therefore, a great many mild cases of the disease have escaped proper care and treatment as a result of lack of scientific diagnosis. The diagnosis can be made with positive certainty by means of the microscopical examination of the feces, and as every state now provides free laboratories for making these examinations, there is no excuse for any physician jeopardizing the life of his patient by guess work.

The severe cases of the disease are an exception, as the mild and medium types (which can *not* be diagnosed by inspection) are decidedly in the majority, and death from hookworm disease is rare. During the ten years that I have been working with the disease, I have known of only one case that died from hookworm disease. The reports regarding the mortality of the disease have been greatly exaggerated, as I have shown in articles in the past.

As to the prevention of the disease, I have called attention to the fact that infection is not nearly as frequent as is generally supposed. Careful clinical investigation shows that children are usually not infected more than two or three times in a summer, even where the soil is extremely polluted and, oftentimes, such children will escape infection during an entire summer. I have pointed out the reason for this in a previous report, and called attention to the fact that infection usually takes place after a rainy spell and that climatic conditions must be favorable. Bearing these facts in mind, it is plain that if the children can be protected during these few periods, the disease can be prevented. The simplest means to prevent infection is to urge the parents to keep barefoot children out of the mud during rainy spells, or to require them to wear shoes at these times. In support of this position, clinical evidence shows that in certain sections, where the disease does not exist, the people are already observing these precautions, even among the negroes. I advocate this measure of prevention because after a long and careful study and investigation of clinical conditions I am convinced that it is the only practicable and feasible means of prevention.

Dr. Guiteras. We are not especially interested in hookworm disease in Cuba except that it would be interesting to find out why the disease is not more prevalent here. My first discovery of uncinaria in Cuba was among Florida people. There are a few local foci in Cuba. We have some in the western part of the Island, imported there apparently by laborers from Porto Rico. There are some cases about Santiago de Cuba, and quite a number in our General Hospital for the Insane. Why it is not so general in Cuba as in Porto Rico, we do not know, except that the population in Cuba is not so concentrated as in Porto Rico, and the cultivation of the sugar cane instead of coffee, may explain the phenomenon.

Dr. Snow. I wish to ask the speaker to say something with reference to the probabilities of hookworm becoming a serious problem in a country such as ours in California. You know we are doing a great deal of irrigating now and have been for some years. I am interested to know what the probabilities are of hookworm spreading in a country with such a climate as we have in this western State.

Dr. John A. Ferrell. The points raised by the discussion as I recall them will be briefly answered.

In regard to the microscopical examinations, we should use every means available to have the diagnoses made microscopically. In our early dispensary work more than half of the examinations were clinical. A physician wrote from one county where the dispensary work had been completed that he had purchased a microscope primarily to enable him to make the hookworm diagnoses. He said that after our field physician had diagnosed a good many cases by clinical symptoms patients going to him later wanted to know why he was not as well able to make clinical examinations as was the hookworm specialist.

Our people are responding nicely in supplying specimens. Clinical diagnoses are seldom wrong in severe cases, but are not so reliable in medium and mild cases. Malarial anemia might be mistaken for hookworm anemia. Hookworm treatment in such a case would fail to produce the expected results, consequently such a mistaken diagnosis would injure the work because the gratifying results usually following treatment would not be had.

In considering the symptoms of the disease, the degree of anemia and other usual symptoms vary, however the classification used by most authors is applicable. This classification is (1) mild cases, (2) medium cases and (3) severe cases.

The prevalence and distribution of the disease in our State is not uniform. For instance, in a county it will be heavier in one school district or neighborhood than in another. With regard to the geographical divisions, I may say it is much more prevalent in the Tidewater Section than in the Piedmont Section. Moreover, it is more prevalent in the Mountain Section than in the Piedmont Section, but lighter there than in the Tidewater Section. Why this is so I cannot say, but I am informed that in Virginia and South Carolina the same general condition is found.

In regard to the question relating to the administration of the work, I gained the impression that the gentlemen desires to know in what way the funds for the conduction of the campaign are obtained. Dr. Freeman has spoken of the million dollar donation by John D. Rockefeller, for the eradication of the disease. It is the intention of the Rockefeller Commission, which was created to direct the spending of this money, that the campaign shall cover a period of at least five years, which means approximately $200,000 will be spent annually. This is apportioned to about ten states. In North Carolina we receive from this fund nearly $20,000.00 annually. The State Legislature, through the State Board of Health, has allowed us $5,000.00 annually additional. Since the dispensary work has been in progress we have received in each county providing for the dispensaries appropriations ranging from $200.00 to $300.00. The sum of these county appropriations exceeds $5,000.00, so that we are actually spending now something like $30,000.00 annually.

The prevention of the disease is equally as important as is the treatment. In fact, where only a small percentage of people are infected, the disease is going to be eradicated only by the general use of sanitary privies. By their use all hookworm ova will be collected and destroyed, as will also typhoid bacilli. As no multiplication of hookworms goes on in the intestines, and as the life of the hookworm is not over ten years, the disease can be gotten rid of even if no cases are treated, provided there is a uniform use by our people of sanitary privies.

In answer to the inquiry by the gentleman from California, I may say the spread of the disease is dependent upon just three things: First, there must be infected people who pollute the soil; second there must be warmth to favor the hatching of the egg; third, there must be moisture. Wherever these essentials for the spread of the disease are found we may expect to find the disease spreading. The climatic conditions of a particular section may be highly favorable to the disease, and yet it will not be found unless it is brought there by some infected person.

What Dr. Porter said in connection with the diagnosis is exceedingly important. By examining the stools of a patient after treatment it is easy enough to see the worms. To encourage the patients treated at the dispensaries to look for the worms, we offer a prize of $3.00 in each county to the person bringing in the largest number of worms. This stimulates interest and enables us to have on hand a supply of hookworms so that we may furnish specimens to interested parties. In awarding the prize we have had no contest in regard to the number of worms. We are always glad to accept the statement of the patient who counted them.

A BACTERIOLOGICAL STUDY OF THE MILK SUPPLY OF WASHINGTON, D. C.

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Health Department, Washington, D. C.

Read before the Laboratory Section of the American Public Health Association, Havana, Cuba, December, 1911.

In September, 1910, a bacteriological examination of the milk supply of Washington was begun, which has been continued without interruption up to the present time. The object of this enquiry was to determine as near as was possible the condition of the milk as it reached the city, and also the condition it was delivered to the consumer; finally, after continuing these examinations for a sufficient time so as to include all the conditions met with during the year to see if it were possible to adduce from the data a betterment of the milk supply.

Now after a lapse of 14 months since starting this study we believe that we have accumulated sufficient information regarding it to state how and wherein the condition of the milk is bad as well as to show where it is good.

There has been no attempt to multiply the number of the daily examinations, but rather to confine ourselves to fewer samples studied so as to subject these to several laboratory methods in determining the bacterial content. The specimens of milk were obtained from various sources and places, the object being to take in all the conditions of the milk supply. These samples were either collected in special sterile containers under strict aseptic precautions, or brought to the laboratory in the original bottle, in both cases these were placed on ice and kept so in transit to the laboratory, where they were examined as soon as possible after their arrival.

Methods of Examination.

As soon as the samples were delivered to the laboratory, a uniform sample was taken from each and the usual number of dilutions were made in normal saline solution, and then one c.c. of each were plated in duplicate on plus 1.5 ordinary agar; also three plates were made of the several dilutions on litmus-lactose agar; and inoculations made in fermentation tubes of peptone-lactose bile, for determining the fermentation and the streptococci and finally, dilutions of 1 to 1,000 and 1 to 10,000 were plated on Endo's fuchsin agar for the colon group.

We have found Endo's media indispensable for the detection and isolation of colon bacilli in milk, and without this it would have been difficult in many instances to have identified this group. Morover, it was a great time saver. One set of plates on ordinary peptone agar, the litmus-lactose plates, the fermentation tubes, were incubated for 24 hours and the colonies counted. The other set of plates on ordinary agar were kept at room temperature for 48 hours and then counted. The Endo plates were examined from 24 to 48 hours, and the fermentation tubes after 4 days.

We have found that if a small quantity of the Endo-agar be poured into the Petri dish and allowed to harden; then adding the dilution of the milk and the Endo-agar just in sufficient amount to mix well, spreading of the colonies between the plate and the media is prevented. This is sometimes troublesome, particularly when the colonies of colon are numerous.

The streptococci were estimated by the dilution method in the fermentation tubes and by a direct examination.

During the 14 months, that is to say from September 20, 1910, to the 1st of November, 1911, there have been 924 samples of milk and cream examined by the above described methods. All the records of the examination were kept on cards, and by these cards, a convenient card-index system is provided.

The milk and cream were collected as they were brought to the city or just as they were intended to the consumer. Only in a few instances was this plan departed from when samples were obtained from institutions of the milk just as it was being issued to the inmates.

The sources of the milk supply of Washington are so well described in a recent Bulletin issued by the Department of Agriculture, that it would be superfluous on our part to go into the details of describing it, further than to add some to it. Since this Bulletin was issued, there has been a considerable quantity of milk and cream shipped to Washington from Ohio, Pennsylvania, and New York, and from quite distant points in these States. Almost all this milk comes to Washington in car load lots; the cream in individual cans and a number of these are usually included in a shipment of less than a car load lot.

Those interested in the subject are referred to the Bulletin No. 138, Department of Agriculture, entitled, "The Milk Supply of Chicago and Washington."

For convenience of consideration and comparison, the examination of the milk and cream will be considered under the following heads: Raw Milk, Pasteurized Milk, and "Sanitary" Milk.

Raw Milk.

Seven hundred and fifty-eight (758) samples of raw mik and cream have been examined: as was to be expected, there was a variable bacterial content; it was full of surprises and paradoxes.

For a better understanding of the bacterial content we have arranged the results of the examination in the form of a table in which the milk is grouped according to the maximum number of bacteria found together with the number of times the colon and streptococci were present.

TABLE I.—RAW MILK.

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Total
1,000 to 10,000........	0	3	2	3	0	3	2	2	0	0	0	0	0	3	18.
Colon and Strept........	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.*
10,000 to 50,000.......	0	3	14	6	5	8	23	11	7	3	1	0	1	7	89.
Colon and Strept........	*0*	*1*	*0*	*1*	*2*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*7.*
50,000 to 100,000......	1	5	5	2	5	4	11	8	3	1	0	1	1	4	51.
Colon and Strept........	*0*	*2*	*0*	*1*	*2*	*1*	*4*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*11.*
100,000 to 500,000.....	18	0	15	5	1	21	15	18	9	13	0	1	16	7	198.
Colon and Strept........	*1*	*6*	*7*	*3*	*2*	*4*	*4*	*6*	*3*	*3*	*0*	*0*	*2*	*2*	*43.*
500,00 to 1,000,000.....	4	10	3	6	4	5	6	3	2	8	4	4	6	6	71.
Colon and Strept........	*3*	*3*	*2*	*2*	*2*	*2*	*3*	*0*	*5*	*2*	*2*	*2*	*5*	*5*	*38.*
1,000,000 and over.....	23	17	20	8	26	11	19	19	28	41	37	57	37	17	360.
Colon and Strept........	*16*	*20*	*14*	*9*	*19*	*10*	*12*	*13*	*24*	*32*	*28*	*48*	*31*	*13*	*289.*

It will be seen by the above table that the colon group was present in the majority of the samples and in the following percentages:

September 66 per cent., October 42 per cent., November 40 per cent., December 39 per cent., January 61 per cent., February 30 per cent., March 30 per cent., April 31 per cent., May 66 per cent., June 65 per cent., July 75 per cent., August 80 per cent., September 67 per cent., October 44 per cent.

These two groups increase pari passu with the rest of the bacteria and as the number increases as it is seen to do during the rise of the temperature, the incidence of these groups become more and more frequent. Our experience leads us to conclude that the colon and streptococci content of a milk can be taken with reasonable certainty to indicate the amount of dirt and filth in milk. Only 35 per cent. of the milk and cream examined, had a bacterial content under 500,000, and the remainder, was above this; 20 per cent. between 500,000 and 1,000,000 and 45 per cent. over 1,000,000.

TABLE II.

Month	Average number of bacteria.	Average temperature of milk.	Average Temp.
September......	5,435,000	63.7 F.	----
October...	15,000,000	55.3	55.6
November	15,800,000	47.3	40.9
December ..	3,070,000	41	27.5
January..	4,085,000	42	33 4
February	4,950 000	44	31
March	1,159,000	43.2	35.9
April.....	3,065,000	50.8	48
May.....	5 700 000	49.8	63.7
June	11,600,000	60.4	68.5
July......	24,130,000	57.2	80.2
August...	34,167,000	62.8	75.2
September	5.700 000	62.8	61.9
October ..	2,640,000	55	53.5

The average number of bacteria of the samples for each month compared with the temperature of the milk at the time of collection together with the average daily temperature is shown in the Table II.

The data of this table taken together with that of Table I shows the influence of the temperature on the bacterial content. Just as soon as the warm weather begins, there is a gradual increase of the number of bacteria. The bad milk increases as the good milk becomes less frequent. Attention is invited to the temperature of the milk as compared with the daily temperature in the above, as well as shown on charts I and II. Here it will be seen that the temperature of the milk during the greater part of the year even in the coolest months, shows that it is a few degrees higher than the daily temperature. This is the case in nearly all the milk which reaches here via the railroad. This seldom if ever reaches Washington with a temperature below 40. F even for those which have a low bacterial content. It is evident from this fact alone, that it will account for a considerable proportion of the number, but it must be understood that we do not believe that this factor alone is responsible for the enormous numbers found, but that there must be other and as potent factors which are the cause of the most of the bad conditions present. We are strongly of the opinion that the main trouble lies in the careless handling of the milk even before it leaves the place of origin, for instance; the milk examined in October and November, 1910, showed a great number of bacteria present and the colon bacilli and streptococci were present in over 40 per cent. of these and in large numbers, yet the average daily temperature was not high. It was cool comparatively.

Milk reaching Washington by Railroad.

For purposes of comparison, two of the principal milk routes to Washington have been selected which in general are very similar in the country through which these run. One is from Frederick, Md., 59 miles distant, and the other from Bluemont, Va., 79 miles distant. The milk on both these railroads is handled about in the same manner and the time of delivery is about the same. A study of the milk on both these routes at all parts of the year does not indicate that the reason for the high bacterial count is not due to any appreciable extent to the time the milk is in transit, as we find milk that is produced at Garret Park, Md., only 12 miles away, as bad if not worse than some coming from Frederick, Md., 59 miles away. This route from Frederick, Md., supplies a considerable portion of the milk. There are on record 552 permits granted to persons to ship milk over this route to Washington. Our examination of the milk from this route, shows that only 35 per cent. of the milk had a count as low as 50,000 per c.c. the remainder having a count much above this.

The Dairy scores of the producers and shippers would lead one to believe that a much better and cleaner milk would be produced, and, it was a disappointment when the comparison was made. A few good milks are to be found all down the line, and frequently from dairies, where you would infer from the score, it would be poor. On the other hand, there are many of the dairies which have a good score where the bacterial content is high.

We have been told that the reason why such paradoxical results are obtained, is that the milk producers along this route are comparatively new to the business and are not too well conversant to what is required to produce and care for milk in the proper way. This may be true, but on account of the enormous numbers of both colon bacilli and streptococci present in the milk taken together with the other bacteria, we believe that dirty methods are responsible for this condition in the majority of cases. It is well to take into consideration another point which may also have a bearing on this, and that is, the dairymen on this route are mainly tenants on the farms and operate the dairy business as a side issue to their farming. In consequence, they do not have their places equipped as they should be, for producing a good milk. Perhaps this is true and should be given a proper weight, yet admitting all this the fact remains that the examination shows the milk to be dirty and filthy in many cases.

It is without doubt that almost all the bacterial content has its origin at the place of production and the time in transit plays but a minor part.

There is a far better showing made of the Virginia route. The result of the examination is almost the reverse of that of the Maryland route, in the matter of samples which had a count of less than 500,000 bacteria per c.c. was 65 percent. and those above this 35 per cent. was from 500,000 to over a million.

The dairy business along this route is better organized and has been longer in operation than that of the Maryland route. There is in general a better equipment and the dairies are better managed. Only 156 permits are in force for this section. This is also evidenced by the dairy scores, which are considerably higher. We find the same thing obtains along this route as mentioned on the other; that some of these dairies with a rather high score, produced some of the worst milk.

The Local Supply.

The local milk supply is drawn from the District and the surrounding country and is brought into the city by vehicle and by trolley. One hundred and thirty-one samples of such milk and cream which have been examined showed a bacterial content of 62 per cent. of these to be less than 500,000 per c.c. of the 38 per cent. the greater proportion of these, had over 1,000,000. Now if we should take the first nine months of the examination—which is the coolest part of the year—we find that 96 of the 131 had a count of 500,000 and below, and for the warm season—5 months—only 9 of the 35 were below the million mark.

The occurrence of colon and streptococci in the local milk is about as often as we find it in those from a distance, and is about the same as are found in that of the Virginia route. The Maryland route exceeds this.

We do not see that the local supply is by reason of its proximity to the city any better than that from the Virginia route. The only thing which can be said in its favor—and this is of the greatest importance,—is that this milk is derived from tuberculin tested cows.

Occasionally, we have found samples of milk which had an enormous number of bacteria and no colon or streptococci. This is evidently an old milk once good or a good milk in an unclean container. This happens to the milk it matters not its source.

The temperature of the milk taken at the time of its collection shows that it is with but a few exceptions higher than the daily temperature, although the samples were collected at or about the same time as the daily temperature was taken. Also, that with the increase of the daily temperature, there was an increase in the number of the bacteria, there being the same increase in all the milk arriving here.

There is evidence that attempts have been made in quite a proportion of the shippers from nearby places to cool their milk. Ice is used by some, others depend on the well or spring water. Much is to be desired before these efforts will be effective in preventing the rise in the number of bacteria, because as it stands now the amount of cooling the milk is too imperfectly applied to amount to much.

It is a foregone conclusion that when a milk is kept at a temperature at or above 50° F. for any length of time there will be a great increase of bacteria even in a short space of time, and more so when the milk has been improperly handled at the time of milking.

We find that when we attempt to apply our count of a certain milk to the temperature there is sometimes such great discrepancies that at first we thought that our methods might be at fault; but after having this repeated several times we were compelled to accept them. But only when we apply these observations to a large number we see the relation between the temperature and the bacterial content. We have of course been able to solve some of the puzzles by finding the variations were due to dirt, or worse.

The local milk supply is susceptible of great improvement before we can say that it is both sanitary and clean. Yet in both these respects, it compares favorably with the milk coming over the aforementioned Virginia route. Possibly, if we would have analyzed the results of the examination of the milk coming into Washington via the other railroad routes we would have had the same data as we have used in the comparison of these two. On the whole, however, the results would not be changed materially, as we have found in comparing a few of the examinations made of milk derived from these other sources, with that of the local supply. Now if it is possible to produce a better milk during the 9 months of the year and with the majority of the samples with 500,000 and less and of the 62 per cent. of the output containing only 13 per cent. colon and streptococci, we feel assured that this can be increased far above the point that now is done. And in view of the fact that a considerable amount of milk is produced by those same dairies during the summer months demonstrates that good milk can be produced by them even during the warmest weather.

Pasteurized Milk and Cream.

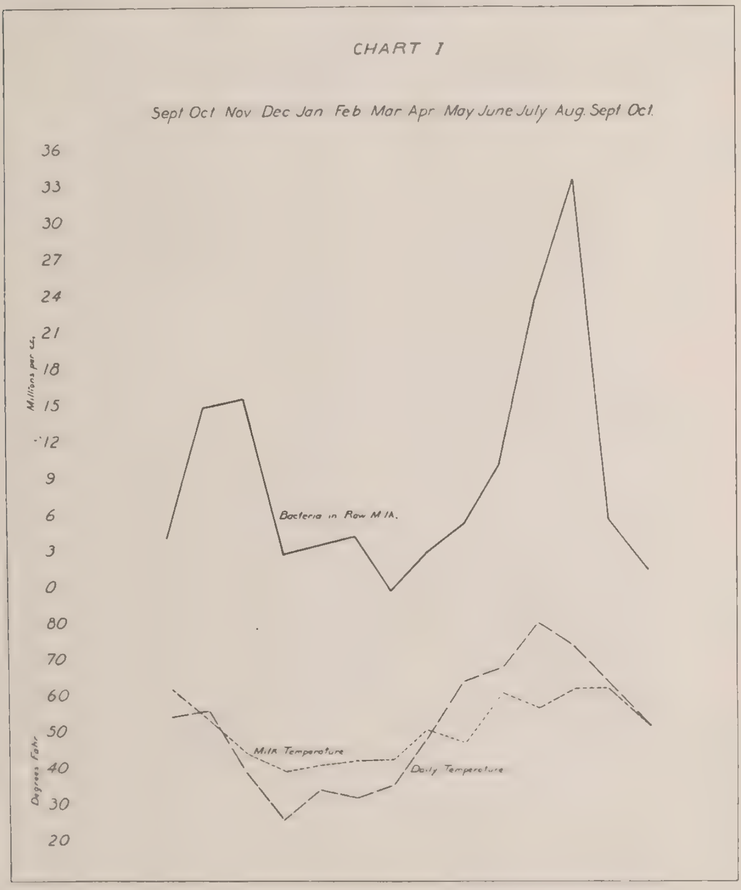
At the time of the beginning of this study there were five plants for pasteurizing in operation; one has been installed only recently. Five of these plants are located in Washington, the other at Frederick, Md. These plants supply all the pasteurized milk used here and nearly all the cream. One hundred and fifty-four (154) examinations were made of this product, the results of these are tabulated in the same way as for the raw milk.

TABLE III.—PASTEURIZED MILK.

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Total
1,000 to 10,000	2	6	1	1	0	2	0	5	1	0	0	0	0	4	22.
Colon and Strept.	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.*
10,000 to 50,000	2	0	1	1	1	3	0	5	3	0	0	0	1	1	18.
Colon and Strept.	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1.*
50,000 to 100.000	1	1	0	0	0	1	0	0	1	1	0	0	0	1	6.
Colon and Strept.	*1*	*2*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*4.*
100,000 to 500,000	0	8	2	2	6	2	3	4	4	2	0	0	2	6	41.
Colon and Strept.	*0*	*1*	*0*	*2*	*2*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*1*	*2*	*9.*
500,000 to 1,000,000	0	3	2	1	2	1	0	0	0	1	1	0	3	3	17.
Colon and Strept	*0*	*3*	*1*	*3*	*2*	*0*	*1*	*0*	*0*	*2*	*1*		*1*	*2*	*16.*
1,000,000 and on	0	5	3	3	5	0	2			5	7	0	1	6	40.
Colon and Strept.	*0*	*4*	*1*	*2*	*4*	*0*	*0*	*2*	*2*	*5*	*7*	*0*	*1*	*6*	*34.*

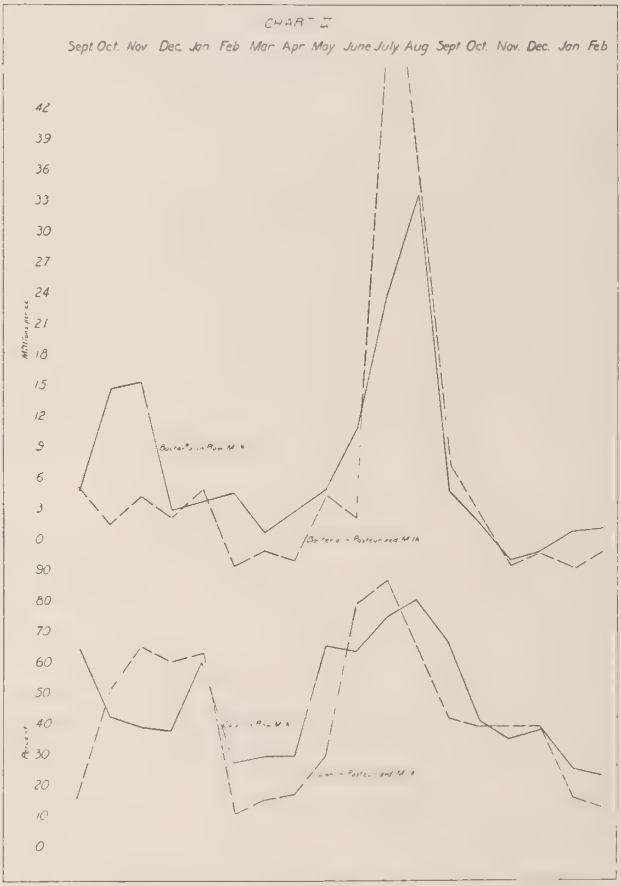
It will be seen that the number of bacteria increases, and as it does the colon and streptococci also increase in about the same ratio, notwithstanding it is "pasteurized." It is not difficult to explain why such a discrepancy should exist when we take into consideration just what has been done. It is a well known fact that the colon group and the streptococci are killed at rather a low temperature, and it was for this purpose that the process of pasteurization was applied to milk. For it is also a well established fact that other micro-organisms of these groups are killed at the same temperature. But when this is not performed can it be truthfully said that this particular milk is in truth what it is labeled? There is also another feature to be considered about this, and that is the milk might have been so dirty or so near the souring point that it was "beyond redemption" if such a term is permissive. Such milk or cream cannot be pasteurized by subjecting it to the time of heating as is found sufficient for a fresh milk with but a fair number of bacteria.

We are afraid this has not always been the object had in view by the operations of these plants, but rather these are used for commercial purposes more frequently than for its true purpose of removing the possible dangers from the milk. There seems to be a current belief held by those engaged in the dairy business that pasteurization is the cure-all for bad milk. By subjecting any kind of milk to the process it may make it wholesome—certainly saleable. This latter view is the one most prevalent and is the reason why such is employed by at least three of these if, one is to draw any inference from the examinations of the output from these plants.



The other three are doing fairly consistent work at all times and even during the warmest weather.

Now all these plants are good and efficient work can be done with them provided they are operated with the proper object in view, that is to kill off the bacteria, and to provide the public with a safe milk. But as evidenced by our examinations, this is secondary to the main purpose of their use. It is nothing more or less than a simple commercial project to sell milk.



The output of some of these are at times worse than if they would purvey a dirty raw milk.

It is impossible to reconcile the fact that a so-called pasteurized milk containing as many as 38,000,000 bacteria per c.c. and 210,000 of these colon bacilli and 100,000 streptococci is anything more than a dirty bad milk. It is unfortunate that such instances are not rare.

TABLE IV.

February, 1911—Raw Milk.

Number	Temperature at time of Collection	Bacteria per c.c. 25° C., 48 hrs.	Colon Group per c.c.	Daily Temperature	Streptococci per c.c.
1	39.2.	550,000.	1,000.	*32°.*	++100.
2	42.8.	33 000.	0.	*32.*	0.
3	46.4.	18,700,000.	115,000.	*32.*	100,000.
4	41.9.	132,000.	0.	*38.*	0.
5	42.8.	1,350,000.	0.	*38.*	0.
6	46.4.	210,000.	0.	*38.*	1,000.
7	41.	148,000.	0.	*28.*	++100.
8	51.8.	130,000.	0.	*28.*	0.
9	42.8.	29,000.	0.	*34.*	0.
10	42.8.	111,000.	0.	*34.*	0.
11	43.7.	370,000.	0.	*22.*	0.
12	41.	240,000.	2,000.	*22.*	1,000.
13	39.2.	510,000.	0.	*22.*	100.
14	39.2.	306,000.	0.	*30.*	100.
15	44.6.	5,400,000.	102 000.	*30.*	10,000.
16	39 2.	190 000.	5,000.	*32.*	1,000.
17	42.8.	176 000.	0.	*32.*	100.
18	42.8.	15,000.	0.	*32.*	0.
19	41.	56,000.	0.	*30.*	0.
20	41.	223,000.	6,000.	*30.*	1,000.
21	42.8.	34,000.	0.	*22.*	0.
22	41.	310,000.	1,000.	*22.*	100.
23	42 8.	8,900,000.	15,000.	*34*	++1,000.
24	44.6.	352,000.	0.	*34.*	100.
25	48.2.	111,000.	1,000.	*34.*	++100.
26	46.4.	93,000.	0.	*34.*	100.
27	42.8.	1,050,000.	9,000.	*36.*	1,000.
28	42.8.	10,200,000.	5,000.	*36.*	1,000.
29	42.8.	133,000.	0.	*30.*	0.
30	48.2.	690,000.	0.	*30.*	0.
31	41.	121,000,000.	690,000.	*30.*	10,000.
32	42.8.	310 000.	0.	*30.*	0.
33	42.8.	530,000.	0.	*30.*	0.
34	46.4.	18,000.	0.	*38.*	0.
35	46.4.	121 000.	0.	*38.*	100.
36	44.6.	210,000.	0.	*38.*	0.
37	48.2.	3,500,000.	9,000.	*54.*	0.
38	50.	410,000.	1,000.	*54.*	1,000.
39	41.	181,000.	0.	*32.*	++1,000.
40	44.6.	82,000.	0.	*32.*	0.
41	46.4.	106,000.	0.	*32.*	0.
42	40.1.	850 000.	0.	*24.*	0.
43	32.	360,000.	0.	*24.*	++100.
44	39.2.	5,600,000.	8,000.	*24.*	10,000.
45	41.	120,000.	1,000.	*28.*	0.
46	44.6.	6,000.	0.	*28.*	0.
47	44.6.	13,000.	0.	*28.*	0.
48	42.8.	7,600,000.	0.	*32.*	0.
49	44.6.	160,000.	0.	*32*	0.
50	44.6.	23,000.	0.	*32.*	0.

There are shipments of milk and cream from distant points sent to Washington which are claimed to have been pasteurized. On arrival these are in great part repasteurized before being distributed. Now all this milk on arrival here has a large bacterial content plus the number of the dead bacteria which were killed in the first process. As all the enzymes of the milk are surely destroyed by this double pasteurization and as the dead and the living bacteria now comprise a considerable part would it not be more in keeping with common sense to boil this kind of milk?

If pasteurization means anything it certainly should not only remove a greater part of the bacterial content and most certainly the colon group, or it fails in its purpose. If this is not done what assurance do we have that this process is any protection against the diseases which may be conveyed by milk, viz; typhoid, diphtheria, bacillary dysentery and tuberculosis.

It stands to reason that when an old milk or a dirty fresh milk is to be pasteurized it should be done in such a manner as to render the product safe, and it should be under the supervision of some one who is not only acquainted with what is required to be done, but how to do it.

From our experiences during the past year, we are of the opinion that there has been but little interest shown by the owners of these pasteurizing plants in the matter of ascertaining the efficiency of their work. None of these have ever requested that an examination be made either for determining whether the process was effective, or for checking up their own bacteriological tests. Two of these plants have a bacteriological examination made by their own bacteriologists, and it must be said that so far as our tests go the process is effective in nearly all the instances which we have examined their output. It is to be regretted that this is not the case with the others; and just so long as the gullible public will buy an old stale filthy decomposed milk under the guise of a label stating that it is a pasteurized milk, just so long will it be purveyed.

Hospital and Institution Milk.

The milk supplied to the several hospitals and institutions is both raw and pasteurized. The bulk of it is raw; only one or two hospitals are supplied with pasteurized. The bacterial content of this milk is about the same as market milk,—the lunch room milk being excepted,—91 samples obtained from these institutions have been examined, the average count per c.c. for the raw milk was 6,252,000 and 48 of these contained both colon and streptococci. The pasteurized milk was not what is should be, the average count per c.c. was 754,000 and 33 per cent. of these both contained colon and streptococci.

Some of the pasteurized milk was good, and contained neither colon or streptococci, and the whole count was low.

The bulk of the milk as is served to the hospitals and institutions is not what it should be and is not in our opinion a proper food for the sick or for

TABLE V.

AUGUST, 1911—RAW MILK.

Number	Temperature at time of Collection	Bacteria per c.c. 25° C., 48 hrs.	Colon Group per c.c.	Daily Temperature	Streptococci per c.c.
1	48.2.	19.000,000.	2,000.	*90°.*	10,000.
2	48.2.	42,000.000.	Innumerable	*90.*	100,000.
3	53.6.	149,000.000.	74,000.	*92.*	100,000.
4	55.4.	4,000,000.	4,000.	*92.*	1,000.
5	46.4.	3,000,000.	12,000.	*94.*	10,000.
6	53.6.	17,000,000.	4,200,000.	*94.*	10,000.
7	50.	4,000,000.	7,000.	*86.*	100,000.
8	48.6.	40,350,000	1.400,000.	*86.*	100,000.
9	55.4.	181,000,000.	65.000.	*84.*	100.
10	50.	8,500,000.	91.000.	*86.*	100,000.
11	51.8.	1,650,000.	2.000.	*86.*	10,000.
12	48.2.	39,000,000.	0.	*92.*	1,000.
13	55.4.	35,600,000.	142 000.	*92.*	1,000.
14	62.	8,230,000.	0.	*94.*	10,000.
15	66.	Innumerable.	2,940,000.	*94.*	100,000.
16	78.	1,190,000.	0.	*90.*	10,000.
17	62.	2,880,000.	2.000.	*90.*	1,000.
18	62.6.	3,570,000.	1,000.	*74.*	100.
19	64.4.	4,600,000.	0.	*74.*	100.
20	68.	3,400,000.	9,000.	*74.*	100.
21	66.2.	396,000,000.	0.	*76.*	100.
22	66.2.	9,500,000.	188,000.	*76.*	100,000.
23	68.	5,400,000.	26,000.	*76.*	10,000.
24	64.4.	1,410,000.	2,000.	*66.*	100.
25	64.4.	8,500,000.	290,000.	*66.*	100,000.
26	69.8.	3,800,000.	6,000.	*66.*	10,000.
27	68.	1,500,000.	2,000.	*66.*	10 000.
28	66.2.	950,000.	0.	*66.*	0.
29	62.6.	940,000.	25,000.	*66.*	10,000.
30	64.4.	10,600,000.	2,000.	*64.*	100.
31	62.6.	261,000,000.	358,000.	*64.*	100,000.
32	64.4.	13,100,000.	0.	*64.*	0.
33	60.8.	7,100 000.	0.	*66.*	0
34	60.8.	2, 950,000.	0.	*66.*	100.
35	64.4.	6,100,000.	1,000.	*66.*	100.
36	71.6.	59,900,000.	310 000.	*68.*	10,000.
37	62.6.	14,100 000.	168,000.	*68.*	100,000.
38	64.4.	60,400,000.	390,000.	*68.*	100 000.
39	59.	950,000.	0.	*72.*	10,000.
40	68.	30,100,000.	5,000.	*72.*	10,000.
41	68.	13,100,000.	21,000.	*72.*	10.000.
42	66.2.	5,200,000.	31,000.	*68.*	10,000.
43	66.2.	20,100,000.	410,000.	*68.*	100,000.
44	64.4.	110,000,000.	320,000.	*68.*	100,000.
45	64.4.	25,200,000.	352,000.	*76.*	100,000.
46	80.6.	24,000,000.	65,000.	*76.*	10,000.
47	68.	1,850,000.	0.	*76.*	0.
48	73.4.	68,100,000.	110,000.	*80.*	100,000.
49	66.2.	10,200,000.	285,000.	*80.*	10,000.
50	68.	8,100,000.	52,000.	*80.*	10,000.

children. Yet notwithstanding its poor quality, it is no better or no worse than the milk that is consumed by the sick of the city outside the hospitals or of the thousands of children.

Only three hospitals have requested the Health Department to make an examination of the milk supplied them. All the others either treated the matter with indifference or even with resentment. Further comment is unnecessary.

Special Milk.

One firm here supplies what it calls a "Sanitary Milk." This milk is of good quality and is properly handled from the time of its production until its issue. The highest bacterial count was 30,000 per c.c. and none contained colon.

Lunch Room Milk.

The milk served in lunch rooms is about as poor a quality as can be had. The average number of bacteria per c.c. of all samples was 20,330,000 and all but six were rich in colon and streptococci.

There were three grades of this bad milk; that from the original bottle contained 11,000,000; that drawn from a tank through a faucet 13,000,000 and that taken out of the can by a dipper 39,000,000.

This is without question the cheapest milk that can be obtained and still maintain the principal physical characteristics of milk. It would be a waste of time to give it further notice, or even dignify it with the title of milk. Swill would be a term more appropriate.

Notices.

It has been the custom to notify a dairyman when the examination of his milk contained a large bacterial content, a part of which is colon bacilli and streptococci, for him to appear on a certain date for a hearing on this particular milk. We have taken at random 24 of the notices sent out and compared the examination made subsequent to the hearing to see if the warning given or the promises made on his behalf had any effect on the improvement of the milk. There was an improvement noted in one case, in the rest none.

We do not consider that it is within the province of this paper to do any more than to state the results of our findings. These we think permit but one interpretation, one which is self evident; that the milk supply of Washington is far, very far from what it should be.

As to the remedy; we will not at this time make any recommendations.

With regard to freeing tuberculosis from the dairy herds; we would state that we are now engaged in a laboratory study of this and hope in the near future to make this the subject of another paper.

November 1, 1911.

REPORT OF THE COMMITTEE ON THE REPORTING OF TYPHOID FEVER, AMERICAN PUBLIC HEALTH ASSOCIATION

Read before the Laboratory section of the American Public Health Association, Havana, Cuba, December, 1911.

GENTLEMEN:

Your Committee submitted to the section on Preventive Medicine and Public Health of the American Medical Association at St. Louis, June 1910, the following resolution:

"The Committee on the Reporting of Typhoid Fever of the American Public Health Association respectfully recommends to the American Medical Association that the principles of Medical Ethics be amended as regards Chapter III, Section 2, Enlightment of Public on Sanitary Matters—Duties in Epidemics, as follows: It is the province of physicians *engaged in public health work* to enlighten the public in regard to quarantine regulations; to the location, arrangement and dietaries of hospitals, asylums, schools, prisons and similar institutions; in regard to measures for the prevention of epidemic and contagious diseases; and when pestilence prevails, it is *the* duty *of all physicians* to face the danger, and to continue their labors for the alleviation of the suffering people, even at the risk of their own lives, *not omitting the foremost duty at any and all times of notifying the properly constituted public health authorities of every case of infectious or contagious disease of which they become aware.*"

(Italicized words are proposed for insertion.)

This was unanimously passed by the said Section and referred to the House of Delegates, but could not be traced any further. At the Los Angeles meeting in June 1911 the resolution was resubmitted to the section and again referred to the House of Delegates. This reference was made in the report of the Reference Committee on section work, (page 141 of the Journal of the A. M. A., for July 8th, 1911, Vol. LVII, No. 2.,) with the suggestion that it be referred to the Reference Committee on Amendments to the Constitution and By-Laws.

There is no statement as to the further fate of this resolution. The Reference Committee on Constitution and By-Laws would appear to consist of Drs. A. T. McCormack (Chairman), Chas. S. Sheldon, J. W. Young, John B. Roberts, and W. B. Russ.

The Committee considers that its specific functions have been accomplished by the action thus secured, and asks to be discharged from further consideration of the matter.

(Signed) E. C. LEVY,
JOHN F. ANDERSON.
CHARLES V. CHAPIN,
H. W. HILL.
Chairman.

American Journal of Public Health
Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. APRIL, 1912. Number 4

$2.00 a year. 20 cents a copy.
Livingston Farrand, M. D., Editor. Selskar M. Gunn, B. S., Managing Editor.
Philip P. Jacobs, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

THE SANITARY ENGINEERING SECTION OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

All who are interested in the public health movement in America must hail with satisfaction the organization of the new Sanitary Section of the American Public Health Association. Sanitary engineers have individually taken an honorable part in the deliberations of the Association since its earliest days. Now, for the first time, however, this branch of public health is officially represented. The new section completes the full round of the professions concerned in the protection of the community against disease. Public health is the work of no one group of men, physicians, engineers or laboratory workers. No association which does not stand for the medical officer, the sanitary engineer, the laboratory worker, the statistician and the sociologist can represent the public health movement of today. The American Public Health Association stands for all these professions, in their relation to the safeguarding of community health, as no other organization stands, or can stand. It is cause for congratulation that the Association is at last completely organized so as to be representative of all the combined forces which are co-operating for the public health.

The founding of a new society, which is practically what the Sanitary Engineering section means, must be justified by good reasons, but in this case ample reasons are forthcoming. There need be no duplication with existing organizations and the need for the new one is clear and obvious. Such societies as the American Society of Civil Engineers and the American Medical Association stand for their respective professions, as distinct professions, and in their own entirety, but the phases of medicine and engineering which deal with public health can only be brought out in a society which stands for public health in all its aspects. Public health is a central area cut by a series of circles grouped about it. Each one of the circles includes much that is not public health and leaves out much that is. Special technical problems in each field may be discussed in such societies as the American Water Works Association, the Sanitary Section of the Boston Society of Civil Engineers, the Society of American Bacteriologists and the section on Preventive Medicine of the American Medical Association. Their relation to each other, however, can only be made clear in a society which stands for the whole field of public health science. The very diversity of training between the experts who must co-operate in the work of the state and municipal health department makes interpretation of their mutual viewpoints peculiarly important. In the circular letter printed elsewhere in this issue, Mr. Rudolph Hering, the chairman of the new section has presented a suggestive outline of its aims with a list of a long series of special problems to which it may address itself. In the sanitary engineering section will come together the medical and laboratory experts who can outline what is needed in the way of sanitary works for the protection of the public health, and the engineering experts who can say what works are practicable and at what cost. Together they can balance the results to be attained against the expense to be incurred and can arrive at sound conclusions as to the relative importance of various public health activities. The extent to which sewage should be purified before its discharge into rivers or harbors and the principles and methods to be applied to the conditioning of air in enclosed spaces are two of the live problems which are urgently pressing for solution and Mr. Hering's catalog includes many more of almost equal importance. These and other questions of pressing moment have suffered severely in the past from the hasty conclusions of pseudo-sanitation. The American Public Health Association will now be able to deal with them wisely and authoritatively; and in so doing it will render notable service to the advancing cause of human conservation.

HOME TREATMENT OF TUBERCULOSIS

Even when we have obtained the proper institutional equipment for both advanced and incipient cases of tuberculosis, it is probable that more and more attention will have to be devoted to the control of this disease in the home. In this connection the experiment of the New York Association for Improving the Condition of the Poor by means of a Home Hospital, is of special noteworthiness. This Association, as outlined in the public Health Notes of March, has leased a section of the East River homes in which a number of selected tuberculous families will be afforded adequate treatment, support, supervision and care. It is hoped that it will be able to demonstrate the possibilities of such treatment under home conditions, not only in arresting the disease, but in preventing further infection of the families. The cost of this experiment will also be carefully determined.

The outcome of this notable procedure will be keenly awaited.

The Anti-Tuberculosis movement gives many evidences of general progress, and what were formerly considered details of the problem, are now pressing for attention and obtaining it.

REMARKS ON THE INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY

J. S. FULTON, M. D.

Secretary General, XV International Congress on Hygiene and Demography

Read before the American Public Health Association, Havana, Cuba, December, 1911.

At the outset, I must express my great gratification that the American Public Health Association has accepted the invitation extended by the Commissioners of the District of Columbia, and will hold its next annual meeting in Washington very near the date of the coming International Congress on Hygiene and Demography. Of the great possibilities which that occasion offers, I have spoken before; it is, therefore, unnecessary to repeat.

At this time, I wish to consider briefly the relations which this Association should assume toward an international gathering of public hygienists and demographers to be held in the United States, and especially the appearance which this Association will make in the Exhibition to be held at that time and place. I look forward with the greatest pleasure to the presentation of an exhibit which will show the history of this Association. With this history, I myself am not so intimate as I hope to be after the Congress is over, and I am inclined to think that the great majority of the members of the American Public Health Association who will attend that Congress will increase their knowledge of the history of this Association quite as much and with as great satisfaction as I shall.

I think first of a definite space set aside for the American Public Health Association, and made known to all men by the flags of the four countries from which the membership of the Association is derived.

Under the flags of Mexico, Cuba, Canada, and the United States we shall assemble whatever objects will tell the story of our past history and of our present activities in public health and vital statistics; but none of us could, at this time, make a list of these objects. I am sure, however, that we shall need a number of glass cases, in which we shall display two full sets of the transactions of the American Public Health Association. These will be opened volumes. One set will be opened at the annual presidential addresses, arranged in order from the first to the last; so that we shall be reminded of many distinguished men; some of them dead and held by us in affectionate memory; some alive but retired; a few still with us in active service. The other set of books should be opened at that article or address which marks the most important contribution of the year. By such means we shall refresh our knowledge of those important epochs which are associated with the names of Americn hygienists. We shall have no small gratification, I think, in an examination of our own publications thus displayed.

We shall also need space for other publications of the Association, for instance, those which resulted from the late Henry Lomb's beneficence, "The Lomb Essays." We should also have in such a collection those important records of committees which have done much to standardize American practice; the report of the Committee on the Standardization of Methods for Water Analysis; and perhaps some publications, notourown, but to which we have contributed; for instance, one or two of the Census Bulletins which have been such effective instruments of progress in the registration of vital statistics. I hope that this collection of books may be embellished with a collection of portraits of distinguished members of the American Public Health Association. If our exhibit were no more extensive than this, it would show that, on this side of the Atlantic, there is, and has been for many years, an important group of men, associated under the title, "The American Public Health Association," who have made the history of public hygiene and vital statistics in four countries.

I hope also that every member of the Association, who will also be a member of the Congress, and present in Washington during the Congress, will be himself an exhibit of the history and activities of the American Public Health Association. Think, for a moment, how many members of this Association hold very important positions in the forthcoming Congress. Shall these members of the Association appear at the Congress in the transient quality of actors in a swiftly passing event? Think of this International Congress and Exhibition as not likely to meet again in the United States for at least a quarter of a century; think of it as a passing event and something more. Think of it as an instrument of great power committed to our use for a very short time, and destined to disperse its energy wastefully unless this energy is appropriated and perpetuated by competent hands. By all means let us singly and collectively, become the competent instrumentalities, through which this power shall be vitalized and perpetuated for the future benefits of our four countries.

The Association should, if possible, have headquarters of its own in a convenient situation. We should establish a center of hospitality which will exert an attraction upon all visitors from whatever part of the world, but especially on those from Canada, Cuba, Mexico, and the United States.

I need not, I think, go into detail concerning the means which we may provide for accumulating and vitalizing for the use of these four great Western populations the innumerable impulses, and the immense aggregate power, which will develop out of this forthcoming Congress.

I hope that no member of the American Public Health Association will fail to appreciate the great significance of this event, which I speak of as a passing event; or will fail to consider himself a medium for its application to the future hygiene of our side of the world.

A PORTABLE OUTFIT FOR THE DETERMINATION OF VISIBLE DIRT IN MILK

F. O. Tonney, M. D.
Director Health Department Laboratory, Chicago.

Read before the Laboratory Section of the American Public Health Association, Havana, Cuba, December, 1911.

The apparatus consists of a Gooch filtration outfit attached to a Chapman pump. The Gooch apparatus, shown in the illustration, is a very commonly used article in chemical laboratories. It consists of a one-liter filter flask fitted with a single perforated rubber stopper into which a Gooch funnel is inserted. A piece of one and one-half inch pure gum tubing is folded over the margin of the funnel and the Gooch crucible is then fitted within the funnel. A piece of pressure tubing leads to the Chapman filter pump. The pump is fitted with a rubber collar attachment, which makes it possible to connect the pump to an ordinary water faucet. It is this feature of the apparatus which makes it portable. It may be used wherever water pressure is obtainable. It is, therefore, available for use in laboratories, creameries, small shipping stations and to a limited extent on more modern dairy farms.

It is usually more practical and economic to sample milk for the visible dirt test, as it is received at creameries and shipping stations rather than at individual farms. A test for visible dirt, of course, is of no value after the milk has passed through the creamery or bottling station, as the milk is commonly filtered before being placed in final containers. For the detection of gross pollution at the receiving stations and tracing such pollution back to the farmer who is responsible, the test is however of unquestionable value.

Directions:

For filtering material a very thin disk of absorbent cotton is used, which is prepared as follows: Wash and dry the fingers thoroughly and draw a small tuft of absorbent cotton from the roll, spreading it smoothly over the index finger and stretching it to the degree of thinness desired. Now dip the cotton, held between the thumb and index finger, into a beaker of cold water. Shape the cotton film to the form of the disk by folding the edges under. Next introduce the disk into the Gooch crucible and pack it in place with wet fingers. It is essential that the disk be thin; otherwise,the rate of filtration will be slow. At the same time it is important that all of the perforations in the bottom of the crucible be covered.

A pint of milk is now shaken thoroughly and poured slowly into the crucible. The bottle must be frequently agitated during the pouring in order to keep the dirt in suspension. If the cotton film is sufficiently thin and the filter pump efficient, the milk runs through very rapidly. The cotton disk is now removed by means of a small pair of pincers and attached by means of a drop of mucilage upon a report blank opposite the name of the farmer or shipper from whom the sample was collected. It is then allowed to dry at room temperature.

The finished product is a glazed surface of transparent mucilage through which the cotton disk, carrying its collection of dirt, may be clearly seen The glaze of mucilage protects against subsequent soiling.

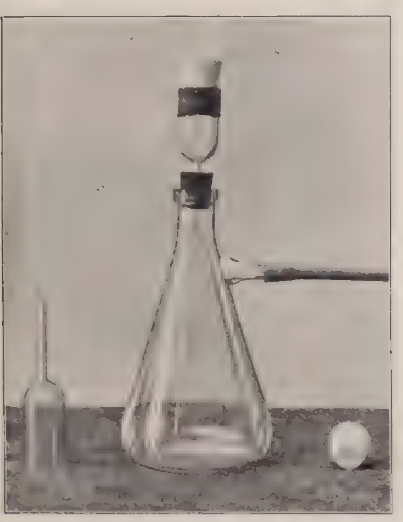


FIG. 1.

Gooch Filtering Apparatus, Showing also Unassembled Parts, *e. g.*, Porcelain Gooch Crucible, with Perforated Sieve Bottom, Glass Gooch Funnel and Pressure Tubing Leading to Chapman Pump.

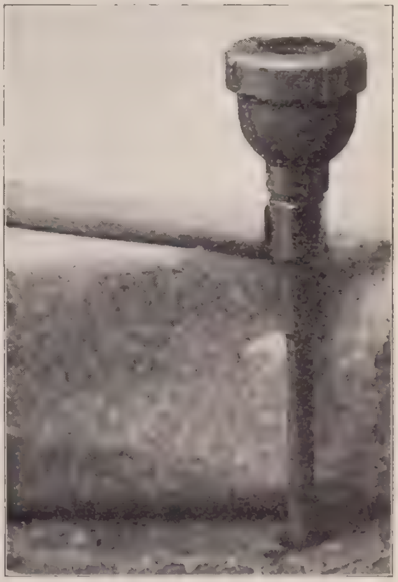


FIG. 2.

Chapman Filter Pump with Rubber Collar Attachment for Fitting over an Ordinary Faucet in a Creamery or Kitchen. The Attachment May Be Obtained from the International Instrument Co., Cambridge, Mass., or from E. H. Sargent & Co., Chicago.

THE STERILIZATION OF MILK BOTTLES WITH CALCIUM HYPOCHLORITE

H. A. Whittaker and B. M. Mohler.
Laboratory Division, Minnesota State Board of Health.

Read before the Laboratory Section of the American Public Health Association Havana, Cuba, December, 1911.

Since public opinion has been sufficiently aroused to demand the distributors in many cities to furnish milk under a certain bacterial count, it is becoming more and more necessary for even the small dairyman to supply himself with the apparatus necessary to assist him in securing these prescribed standards.

One of the problems which confronts both the producer and likewise the distributor of milk is the sterilization of utensils used in collecting and distributing the product. Undoubtedly the ideal method of rendering these utensils free from bacteria is by steam sterilization. This method, however, necessitates the installation of expensive apparatus and the cost of operating a steam sterilizing plant even for the requirements of a small dairy farm is correspondingly great. In other words, the small producer can scarcely afford such apparatus, and as a result the utensils add to the bacterial count of the milk from day to day.

In the investigation of small dairy plants the application of hypochlorite to the sterilization of milk apparatus suggested itself to the writers as a method of sterilization simple in its application with a possible field of merit. The investigations of this paper have been confined to a determination of the relative efficiency of various solutions of calcium hypochlorite in the sterlization of milk bottles. A number of dairies were visited and the work was done on the spot with the apparatus actually in use by the dairymen at that time. In this way it was possible to determine the relative efficiency of this chemical under a variety of conditions. The exact procedure of the work was carried out as follows: The dairy selected for investigation was visited with sufficient apparatus to do immediate plating for the bacterial count before and after treatment. The milk bottles used in the experiments were selected from those already cleaned and ready for refilling with milk for distribution. A solution of calcuim hypochlorite of known strength was carried so that a definite amount could be added to the local water used in the process of treatment. The treatment was done in a tub or tank of sufficient size to permit the submerging of the bottles used. The technique of obtaining the count on bottles before and after treatment consisted in rinsing the inside of the bottle as thoroughly as possible with a definite amount of sterile, distilled water and immediately plating an aliquot part of the liquid. The counts were made on standard agar medium and incubated for 24 hours at 37.5° C. During this investigation eight dairies were visited and the treatment was conducted as indicated in Table I.

It should be mentioned here that the method of washing the bottles used at the dairies visited, was practically identical. The bottles were first washed by means of a brush in a sodium carbonate solution followed by a rinsing in clean water.

The source of the water used in the process of treatment at the different dairies varied considerably. Dairies No. 1, 5, 7 and 8 derived their supply from the Mississippi river, No. 2, 4 and 6 from deep, drilled wells, and No. 3 from a shallow, driven well:

The bacterial count on the bottles before treatment show a wide range in the number of organisms present. The counts on the total number of bottles examined from the eight sources (Table I) show a minimum count of 30., a maximum count of 1,600,000 and an average count of 120,000 per bottle. The counts on these same bottles after treatment (Table I) show a minimum count of 0., a maximum of 540. and an average of 45. per bottle.

During the investigation the amount of chemical rendering efficient results was reduced from 20 to 10 parts per million of available chlorine and the time of exposure from one hour to twenty minutes.

The summary of results (Table II) computed from the average results under the conditions indicated, show a removal of over 99.9 per cent. of the bacteria by this treatment. From the results it appears that by submerging milk bottles in a water to which calcium hypochlorite in the amount of 10 parts per million of available chlorine has been added, a very marked reduction in the bacterial count is effected. An examination was made of the organisms remaining after treatment on the plates from dairies No. 2 and 3 and over 95 per cent. of these organisms were found to be spore bearers.

Summary and Conclusions.

1. The sterilizing of milk bottles by submerging in a solution of calcium hypochlorite appears to be a quick and inexpensive method of materially reducing the organisms present.

2. It is not the intention of the writers to recommend this as a substitute for thorough steam sterilization but simply to be used as an expedient when the other method is impracticable.

3. The total, average, bacterial efficiency of over 99.9 per cent. on the 20 minute treatments with calcium hypochlorite in amounts not exceeding 10 parts per million of available chlorine shows merit in the application of hypochlorite for this purpose.

4. A series of investigations are now under way in this laboratory to further substantiate these results and to apply the method to actual practice.

The writers wish to acknowledge the valuable advice and criticisms of Dr. R. H. Mullin, Director of Laboratory Division of the Minnesota State Board of Health, under whose supervision the investigation was conducted.

TABLE I.

DETAILS OF ANALYTICAL RESULTS.

Date	Source of bottles	Size of bottles	Bacteria in bottle before treatment	Hypochlorite parts per million available chlorine	Time exposed to hypochlorite	Bacteria in bottle after treatment
7-3-11	Dairy No. 1	1 qt.	80.	20.	1 hour	0.
"	" " "	"	6,000.	"	" "	0.
"	" " "	"	30.	"	" "	0.
"	" " "	"	96,000.	"	" "	40.
7-10-11	" " 2	"	6,800.	"	" "	30.
"	" " "	"	32,500.	"	" "	0.
"	" " "	"	140,000.	"	" "	0.
"	" " "	"	16,500.	"	" "	100.
"	" " "	"	16,000.	"	" "	0.
"	" " "	"	1,000,000.	"	" "	155.
"	" " "	"	82,000.	"	" "	85.
"	" " "	"	9,600.	"	" "	0.
"	" " "	1 pt.	26,000.	"	" "	50.
"	" " "	"	50,500.	"	" "	150.
"	" " "	"	26,500.	"	" "	0.
"	" " "	"	29,600.	"	" "	10.
"	" " "	"	27,000.	"	" "	5.
"	" " "	"	38,000.	"	" "	20.
"	" " "	"	26,000.	"	" "	30.
7-12-11	" " 3	"	74,000.	"	" "	150.
"	" " "	"	750.	"	" "	10.
"	" " "	"	380.	"	" "	15.
"	" " "	"	325.	"	" "	0.
"	" " "	"	1,300.	"	" "	20.
"	" " "	"	7,500.	"	" "	25.
"	" " "	"	250.	"	" "	0.
"	" " "	"	300.	"	" "	5.
"	" " "	"	225.	"	" "	0.
"	" " "	"	150.	"	" "	5.
"	" " "	"	18,500.	"	" "	20.
"	" " "	"	3,700.	"	" "	5.
"	" " "	1 qt.	850.	"	" "	0.
"	" " "	"	350.	"	" "	0.
"	" " "	"	1,300.	"	" "	5.
"	" " "	"	2,200.	"	" "	5.
"	" " "	"	3,100.	"	" "	0.
"	" " "	"	1,200.	"	" "	10.
"	" " "	"	800,000.	"	" "	20.
"	" " "	"	3,000.	"	" "	5.
"	" " "	"	14,500.	"	" "	0.
"	" " "	"	2,500.	"	" "	0.

TABLE I.—DETAILS OF ANALYTICAL RESULTS.—*Continued.*

Date	Source of bottles	Size of bottles	Bacteria in bottle before treatment	Hypochlorite parts per million available chlorine	Time exposed to hypochlorite	Bacteria in bottle after treatment
7-12-11	Dairy No. 3	1 qt.	1,300.	20.	1 hour.	0.
6-30-11	" " 1	1 pt.	1,800.	10.	" "	10.
"	" " "	"	7,400.	"	" "	10.
"	" " "	"	11,500.	"	" "	30.
"	" " "	"	900.	"	" "	0.
"	" " "	"	1,900.	"	" "	0.
"	" " "	"	6,900.	"	" "	40.
"	" " "	"	450.	"	" "	0.
"	" " "	"	5,400.	"	" "	40.
7-18-11	" " 4	"	115,000.	"	" "	45.
"	" " "	"	100,000.	"	" "	15.
"	" " "	"	170,000.	"	" "	10.
"	" " "	"	28,500.	"	" "	10.
"	" " "	"	12,000.	"	" "	60.
"	" " "	"	17,500.	"	" "	45.
"	" " "	"	14,000.	"	" "	5.
"	" " "	"	18,500.	"	" "	15.
"	" " "	"	21,000.	"	" "	10.
"	" " "	"	1,200.	"	" "	20.
"	" " "	"	11,000.	"	" "	20.
"	" " "	"	9,100.	"	" "	5.
"	" " "	1 qt.	1,600,000.	"	" "	115.
"	" " "	"	8,600.	"	" "	70.
"	" " "	"	970,000.	"	" "	150.
"	" " "	"	160,000.	"	" "	30.
"	" " "	"	390,000.	"	" "	250.
"	" " "	"	970,000.	"	" "	20.
"	" " "	"	1,000,000.	"	" "	540.
"	" " "	"	170,000.	"	" "	50.
"	" " "	"	58,000.	"	" "	0.
"	" " "	"	46,000.	"	" "	60.
"	" " "	"	125,000.	"	" "	30.
8-23-11	" " 5	1 pt.	60,000.	"	30 min.	20.
"	" " "	"	100,000.	"	" "	10.
"	" " "	"	40,000.	"	" "	20.
"	" " "	"	800,000.	"	" "	60.
"	" " "	"	130,000.	"	" "	10.
"	" " "	"	100,000.	"	" "	30.
"	" " "	"	1,000,000.	"	" "	100.
"	" " "	"	130,000.	"	" "	10.
"	" " "	"	150,000.	"	" "	10.
"	" " "	"	90,000.	"	" "	0.
"	" " "	"	89,000.	"	" "	10.

TABLE I.—DETAILS OF ANALYTICAL RESULTS.—*Continued.*

Date	Source of bottles	Size of bottles	Bacteria in bottles before treatment.	Hypochlorite parts per million available chlorine	Time exposed to hypochlorite	Bacteria in bottle after treatment
8–23–11	Dairy No. 5	1 pt.	200,000.	10.	30 min.	30.
10–9–11	“ “ 6	“	130,000.	“	20 “	25.
“	“ “ “	“	150,000.	“	“ “	90.
“	“ “ “	“	160,000.	“	“ “	35.
“	“ “ “	“	180,000.	“	“ “	45.
“	“ “ “	“	310,000.	“	“ “	50.
“	“ “ “	“	140,000.	“	“ “	50.
“	“ “ “	“	120,000.	“	“ “	50.
“	“ “ “	“	120,000.	“	“ “	25.
“	“ “ “	“	110,000.	“	“ “	40.
“	“ “ “	“	110,000.	“	“ “	540.
“	“ “ “	1 qt.	23,000.	“	“ “	75.
“	“ “ “	“	310,000.	“	“ “	40.
“	“ “ “	“	480,000.	“	“ “	120.
“	“ “ “	“	47,000.	“	“ “	55.
“	“ “ “	“	42,000.	“	“ “	40.
“	“ “ “	“	15,000.	“	“ “	60.
“	“ “ “	“	20,000.	“	“ “	75.
“	“ “ “	“	81,000.	“	“ “	35.
“	“ “ “	“	51,000.	“	“ “	45.
“	“ “ “	“	62,000.	“	“ “	60.
11–15–11	“ “ 7	1 pt.	6,100.	“	“ “	0.
“	“ “ “	“	240,000.	“	“ “	50.
“	“ “ “	“	260,000.	“	“ “	280.
“	“ “ “	“	135,000.	“	“ “	50.
“	“ “ “	“	3,800.	“	“ “	10.
“	“ “ “	“	38,000.	“	“ “	30.
“	“ “ “	“	129,000.	“	“ “	40.
“	“ “ “	“	36,500.	“	“ “	40.
“	“ “ “	“	500.	“	“ “	0.
“	“ “ “	“	1,000.	“	“ “	10.
“	“ “ “	“	9,000.	“	“ “	20.
“	“ “ “	“	120,000.	“	“ “	30.
“	“ “ “	“	200.	“	“ “	20.
“	“ “ “	“	200.	“	“ “	10.
“	“ “ “	“	140,000.	“	“ “	50.
11–20–11	“ “ 8	“	31,500.	“	“ “	100.
“	“ “ “	“	900.	“	“ “	10.
“	“ “ “	“	900.	“	“ “	10.
“	“ “ “	“	1,200.	“	“ “	10.
“	“ “ “	“	300,000.	“	“ “	190.
“	“ “ “	“	3,200.	“	“ “	60.
“	“ “ “	“	7,000.	“	“ “	70.

TABLE I.—DETAILS OF ANALYTICAL RESULTS.—*Concluded.*

Date	Source of bottles	Size of bottles	Bacteria in bottle before treatment	Hypochlorite parts per million available chlorine	Time exposed to hypochlorite	Bacteria in bottle after treatment
11-20-11	Dairy No. 8	1 pt.	2,700.	10.	20 min.	60.
“	“ “ “	“	900.	“	“ “	0.
“	“ “ “	“	6,100.	“	“ “	50.
“	“ “ “	“	4,300.	“	“ “	60.
“	“ “ “	“	15,500.	“	“ “	70.
“	“ “ “	“	600.	“	“ “	40.
“	“ “ “	“	310,000.	“	“ “	270.
“	“ “ “	“	1,300.	“	“ “	30.
“	“ “ “	“	600.	“	“ “	20.
“	“ “ “	“	700.	“	“ “	20.

TABLE II.

SUMMARY OF ANALYTICAL RESULTS.

Number of bottles treated	Hypochlorite parts per million available chlorine	Time exposed to treatment	Percentage removal of bacteria
42.	20.	1 hour	99.962
32.	10.	1 “	99.972
12.	10.	30 min.	99.983
52.	10.	20 “	99.927

THE TREATMENT OF THE BALTIMORE DRINKING WATER BY MEANS OF CALCIUM HYPOCHLORITE.

William Royal Stokes and F. W. Hachtel
Baltimore, Md.

Read before the American Public Health Association, Havana, Cuba, December, 1911.

The use of calcium hypochlorite for the destruction of bacteria in drinking water was first proposed by Traube[1] in 1894, who reported that when this chemical was added to water in a quantity corresponding to 1 part of available chlorine in one million parts of water, the water containing many bacteria was practically sterilized in two hours. But although its use in disinfecting sewage had been practiced for sometime before this date, yet its practical application to the purification of drinking water was not made until 1908.

According to Johnson[2], the first practical demonstration of this process was made at the filter plant of the Chicago Stock Yards in the fall of 1908, and this was soon followed by the adoption of this method at Boonton for the purification of the drinking water of Jersey City. The method has since been introduced in many American cities, among which can be mentioned New York, Brooklyn, Cincinnati, Columbus, Harrisburg, Philadelphia, Pittsburgh, Hartford, Montreal, Nashville, St. Louis, Toronto, Minneapolis, Quincy, Ill., Omaha, and Cambridge, England.

Owing to the application of this method to the drinking water of these various cities, a large amount of data has been accumulated concerning the percentage of bacterial destruction and the amount of available chlorine necessary to accomplish good results, and the following table will show the results published from some of the above cities.

The following table shows that although relatively small amounts of hypochlorite have been used in various cities, yet in most of these cities the bacterial reduction has varied between 93 per cent. and 99 per cent. Toronto shows the small bacterial reduction of 77 per cent. with 0.33 parts of available chlorine per million, while Minneapolis with 1.1 parts per million only shows a reduction of 77.5 per cent.

BACTERIAL REDUCTION EFFECTED BY THE TREATMENT OF THE BALTIMORE DRINKING WATER.

The water supply furnished to Baltimore is obtained by two large impounding reservoirs, which collect the water respectively of the Gunpowder River and the stream known by the name of Jones Falls. Both of these

TABLE NO. I.

Place.	Date of Commencement.	Million Gallons Treated Daily.	Parts per Million av. Cl. added.	Per cent. Reduction of Bacteria.	B. Coli in Treated Water.
Harrisburg, Pa.	July, 1909		0.39	99.7	
Hartford, Conn.			1.0	Over 99.5	Not found.
Jersey City, N. J.	Jan., 1909	40	0.2	99.5	Only one in 455 tests.
Minneapolis, Minn.	Feb., 1910	20	(1.1 at first) to be reduced.	77.5	Not found.
Montreal, Canada	Jan., 1910	40	0.35	99.5	
Nashville, Tenn.	Aug., 1909	14	0.45	98.4	No coli.
Quincy, Ill.	Apr., 1909		1.1 to 0.45	99.7 to 98.3	
Toronto, Canada	Mar., 1910	35	0.33	77	Absent in 16 tests.
Milwaukee, Wis.		50	0.3	99	
Omaha, Neb.			0.45	93	Present 4 in 216 tests.
Cambridge, England				97	Not found.

streams run through a densely populated rural district. The water from each impounding reservoir is then led by a conduit to four storage reservoirs for the Loch Raven system and three for the Lake Roland system, and from these storage reservoirs the water is distributed to the citizens. The solution of calcium hypochlorite is mixed with the water at the gate chambers as the water flows from the impounding reservoirs into the conduits leading into the storage reservoirs.

The normal feed from the Loch Raven impounding reservoir is sixty million gallons per day, but at times the rate is increased from seventy-five million to even one hundred million gallons per day. This impounding reservoir collects the water from the Gunpowder River. The normal feed from the impounding reservoir known as Lake Roland is ten million gallons per day, but this feed is increased to as high as fifteen million gallons per day. Lake Roland is the impounding reservoir which collects the water from the stream known as Jones Falls.

The hypochlorite treatment of the Baltimore drinking water was begun about June 15th, 1911, the amount being 0.4 of one part of available chlorine per million. This was increased on July 23d to 0.6 of one part per million. It was again increased to 0.75 of one part per million on the 29th of August, and to 1.0 part per million on October 15th. The average number of bacteria present in the Gunpowder supply from daily counts during June, July, August, September and October was 32,550, and from the Jones

Falls supply was 44,080. The bacterial reduction in the storage reservoirs varied between 95.5 per cent. and 99 per cent. the average bacterial reduction for the five months being 97.7 per cent. The bacterial reduction of the water received from the taps and used by the citizens varied between 94.5 per cent. and 99 per cent., the average reduction for the five months being 97.3 per cent. The highest bacterial reduction has been in October, namely 99 per cent., both in the storage reservoirs and in the water from the taps, being 99 per cent. in both instances.

The percentage of positive tests for the colon bacillus in 1 and 1-10 cubic centimeters has also been obtained both for the treated and untreated water, and it was found that the colon bacillus was present in 1-10 c.c. in 57.5 per cent. of the untreated water and in 1 c.c. in 89 per cent., of cases. In the treated water the colon bacillus was found in 1-10 c.c. in 12 per cent. of cases and in 1 c.c. in 40 per cent. of cases. The most favorable results have been obtained since the use of 1.0 part of available chlorine per million, showing only 9.5 per cent. of positive tests in the 1-10 c.c. and 37 per cent. of positive tests in 1 c.c. of water, this corresponding to 86 per cent. of positive tests in 1-10 c.c. of untreated water and 100 per cent. of positive tests in 1 c.c. of untreated water. From the above figures it will be seen that the effect of the hypochlorite is most marked upon the general water bacteria, and that the actual percentage of reduction of the colon bacillus does not correspond to the general reduction of from 95 per cent. to 99 per cent. of destroyed water bacteria.

THE DESTRUCTIVE ACTION OF CALCIUM HYPOCHLORITE UPON THE PATHOGENIC AND INTESTINAL BACTERIA.

The effect of different dilutions of calcium hypochlorite upon the pathogenic intestinal bacteria has also been studied, and the amounts of chlorine necessary to kill even different members of the same species seem subject to moderate variations, as pointed out by Wesbrook,[3] Whittaker and Mohler.

These investigators have shown that water richly sown with various strains of the typhoid and colon bacillus required from one to three parts of chlorine per million parts of water in order to completely destroy these bacteria in four hours. Numbers varying between 15,000 and 2,000,000 bacteria per cubic centimeter were introduced into the water in the test flasks, and these quantities far exceed any met with in polluted drinking water.

The action of chlorine upon the cultures of the spirillum of Asiatic cholera in water has also been tested by Harding,[4] who showed that numbers varying from 10 to 1,000 per cubic centimeter could be practically destroyed in thirty minutes. In a few of his test plates he obtained from 1 to 3 colonies, but if he had taken cultures at the end of 3 or 4 hours these would almost certainly have been destroyed. On carefully examining the tables by Westbrook and his assistants it will be seen that 1½ parts of chlorine per million were sufficient to destroy the typhoid and colon bacillus in about four hours, and it will be seen, therefore, that from 1 to 1½ parts of chlorine per million will destroy the pathogenic and intestinal bacteria even when present in the drinking water in very large numbers.

THE EFFECT OF THE CALCIUM HYPOCHLORITE TREATMENT UPON THE CHEMICAL CONSTITUENTS OF THE WATER.

The following table shows the averages of the various chemical constituents made from a large number of routine examinations of the water. The results from the various portions of the system are placed in order beginning with the Loch Raven impounding reservoirs and ending with the specimens of tap water supplied by this system, and again beginning with the Lake Roland impounding reservoirs and ending with the taps supplied by this system. The most important point to be determined was to see whether the hypochlorite treatment of the drinking water caused an increase in the amount of chlorine in the water itself, but an examination of the table will show that there was no increase in the chlorine perceptible, the average from the Loch Raven impounding reservoir before treatment being 4.3 and the average from the tap water from this system being 3.9; while the average from the Lake Roland impounding reservoir before treatment was 6.3 and the average from the various storage reservoirs ranged from 5 to 6 parts per million.

TABLE NO. 2.

TABLE OF AVERAGE CHEMICAL ANALYSES OF WATER BEFORE AND AFTER HYPOCHLORITE TREATMENT.

RESULTS STATED IN PARTS PER MILLION.

		Nitrogen as			
	Chlorine.	Free Ammonia.	Albuminoid Ammonia.	Nitrites.	Nitrates.
Loch Raven	4.3	.090	.112	.011	.372
Lake Montebello	4.2	.086	.106	.019	.297
Lake Clifton	4.3	.063	.070	.022	.402
Lake Guilford	4.0	.063	.037	.003	.202
Lake Ashburton	4.3	.006	.046	.004	.247
Gunpowder Taps	3.9	.001	.040	.003	.525
Lake Roland	6.3	.028	.160	.004	.174
Lake Hampden	6.1	.107	.151	.010	.288
Druid Lake	6.1	.022	.104	.009	.143
Western High Service	5.0	.037	.132	.011	.200
Jones Falls Taps	5.9	.049	.060	.005	.086

The table also shows a gradual oxidation of the free and albuminoid ammonia into nitrites and nitrates. The amount of free and albuminoid ammonia and of nitrites gradually decreases as the water passes from the impounding reservoir into the various storage reservoirs. The nitrates show a somewhat irregular increase, but with the exception of the Jones Falls taps there is quite a contrast between the nitrates of the raw water and of the water from the city taps. The averages from the Jones Falls taps are based upon a very small number of examinations, and we believe that if more examinations had been made the results would have been in accord with the general results obtained from the other examinations.

On analyzing the records of typhoid morbidity and mortality for Baltimore we have thought it best to compare the monthly figures beginning with the year 1906 and ending with the year 1910 with the figures for the corresponding months of 1911. The following table will show the figures in detail.

On examining Table No. 3 it will be seen that the number of cases of typhoid fever during 1911 are less by 202 than the average number of cases for the past five years, and the deaths are less by 38 than the average number of deaths for the last five years. On examining the comparative figures for 1910 and 1911 a much greater difference is observed, for although the reported cases for the first five months in 1911 were nearly double the figures in 1910, yet there is a marked diminution of both cases and deaths beginning with June, when the hypochlorite treatment was begun. The total number of cases for 1910 was 1891, whereas the total number for 1911 was only 1201. The total number of deaths for 1910 was 235, whereas the total number of deaths for 1911 was 154. The tables for the last five years certainly show a tendency towards a gradual increase in the cases of typhoid yearly, and this makes the reduction in the cases and deaths for 1911 slightly more favorable, especially when we bear in mind that there has been an estimated increase in the population since 1906 of 25,000.

The chart which follows shows in a graphic manner the decrease in typhoid cases after the hypochlorite treatment of the water was begun. The dot-and-dash line shows the number of reported cases by months in Baltimore in 1910. These reach a maximum of 473 cases in August. The dotted line shows the average number of cases by months for the five years from 1906 to 1910. The solid line shows the number of reported cases by months for 1911, and it will be seen that the curve for 1911 remains practically above both of the other lines until June. It then crosses the curves for 1910 and for the monthly average of the past five years, and remains well below both throughout the rest of the year. The contrast in the chart is quite striking, and the chart indicates that the hypochlorite treatment was begun about the first of June. It is just at this point that

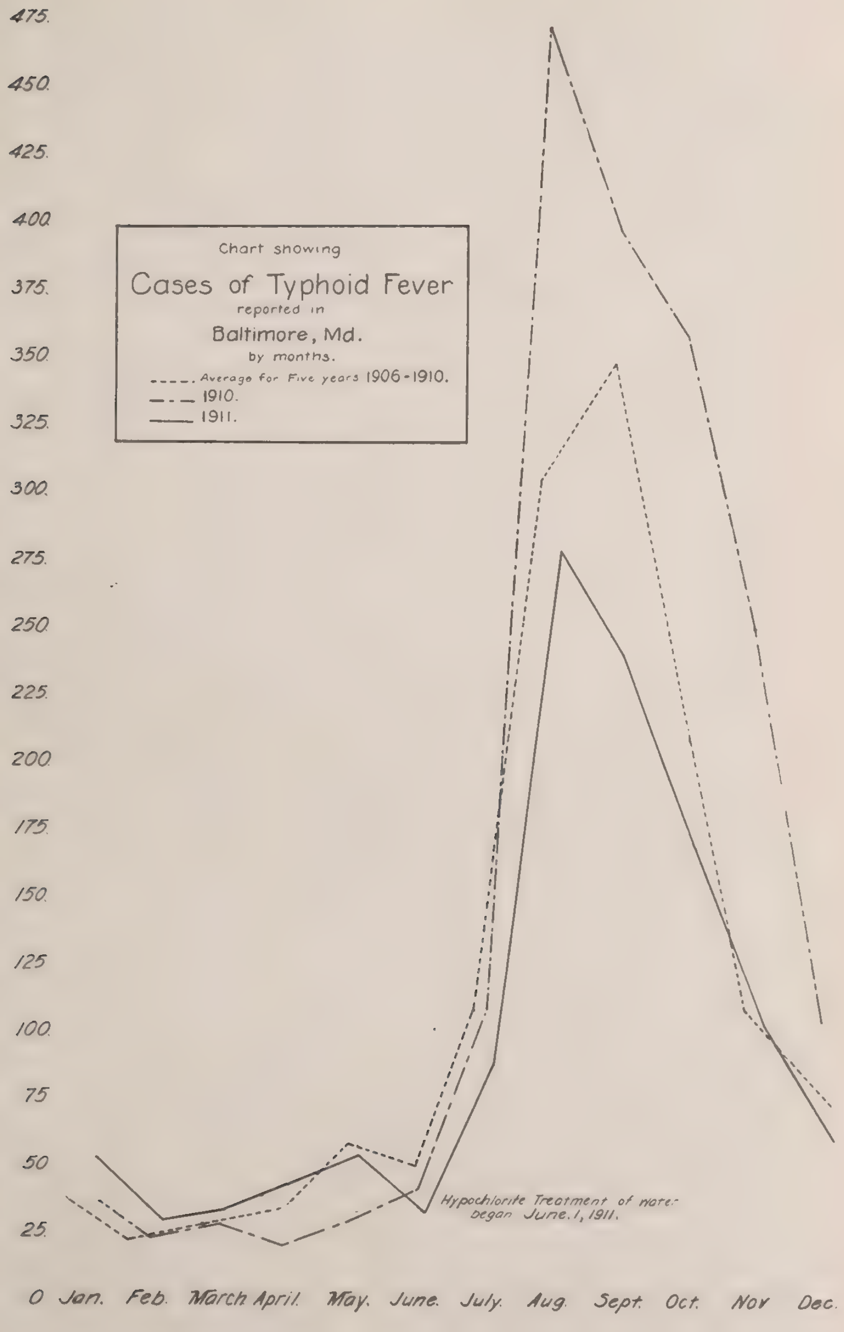


Chart showing
Cases of Typhoid Fever
reported in
Baltimore, Md.
by months.
Average for Five years 1906-1910.
1910.
1911.
475.
450.
425.
400.
375.
350.
325.
300.
275.
250.
225.
200.
175.
150.
125
100.
75
50
25.
0
Jan.
Feb.
March
April.
May.
June.
July.
Aug.
Sept.
Oct.
Nov
Dec.
Hypochlorite Treatment of water began June. 1, 1911.

TABLE NO. 3.

Typhoid Fever in Baltimore, January, 1907, to December, 1911.

Showing Decrease in Morbidity and Mortality Since the Use of Hypochlorite.

	1906.		1907.		1908.		1909.	
	Case Incidence.	Deaths.	Case Incidence.	Deaths.	Case Incidence.	Deaths.	Case Incidence.	Deaths.
January . . .	31	12	43	12	47	7	39	16
February . .	31	6	16	5	26	9	23	3
March	25	6	37	6	36	3	20	5
April	67	11	35	17	24	2	22	4
May	143	12	65	3	40	3	23	5
June	87	5	41	6	47	3	41	6
July	105	14	78	22	149	24	107	11
August	284	34	217	23	339	35	217	20
September .	206	32	469	41	364	29	312	24
October	125	26	241	47	187	30	138	23
November .	59	15	87	31	99	25	61	10
December . .	46	10	91	17	68	10	66	9
Total . .	1209	183	1420	230	1426	180	1069	136

	1910.		**1911.**		Average 5 yrs. 1906–1910.	
January . . .	40	7	**55**	**11**	40	10.8
February .	25	11	**31**	**3**	24	6.8
March	30	12	**35**	**5**	29	6.4
April	22	4	**44**	**8**	36	11.2
May	31	2	**56**	**7**	60	5.0
June	46	8	**34**	**8**	52	4.2
July	110	7	**89**	**4**	110	15.6
August	473	30	**280**	**22**	306	28.4
September .	398	49	**241**	**31**	349	35.0
October	359	42	**170**	**28**	210	33.6
November .	251	37	**104**	**19**	111	23.6
December . .	106	26	**62**	**8**	75	14.4
Total . .	1891	235	**1201**	**154**	1403	192.8

the typhoid morbidity begins to drop and the curve indicates that it remains below the other lines during the rest of the year.

It is a difficult matter to draw any final conclusions concerning the hypochlorite treatment of the drinking water in such a short space of time, but the figures at least are encouraging, and it is hoped that these favorable results will continue.

Conclusions.

The present report can only be considered as a preliminary investigation and no lasting conclusions can be drawn from data secured during such a short period of time. The results obtained, however, show that the hypochlorite treatment produces a marked diminution in the bacterial content of the treated water. We have also noted a diminution in the number of cases of typhoid fever after the treatment of the water was inaugurated, but while these results are encouraging we wish to withhold a positive opinion as to the effect of the hypochlorite treatment until we have secured further data covering a period of several years.

We desire to express our appreciation of the great aid we have received in this work from Dr. James Bosley, Commissioner of Health, under whose direction the work has been performed, and from Mr. Ezra Whitman, Water Engineer, who has carried out the details of construction and the treatment of the water.

Literature.

1. Traube. Zeits. f. Hyg., Vol. XVI., 1894, p. 149.

2. Johnson. Jour. Amer. Pub. Health Assoc., Vol. 1, No. 8, Aug. 1911, p. 562.

3. Wesbrook, Whittaker and Mohler. Jour. Amer. Pub. Health Assoc., Vol. 1, No. 2, 1911, p. 123.

4. Harding, London Lancet, Vol. CLXXIX., No. 4547, Oct. 22, 1910, p. 12 and 13.

THE DISTRIBUTION OF CASES AMONG THE SEVERAL PRODUCERS IN EPIDEMICS OF NON-MILK-BORNE INFECTIOUS DISEASE

William T. Carpenter,
Bacteriologist, Cincinnati Water Works.

In the study of a number of cases of infectious disease occurring in a community, the first effort in ascertaining the source of the outbreak is naturally in the direction of finding common factors, such as drinking water supply, milk, oysters, etc. It is a commonplace to say that if all cases occur among the customers of a certain milk vendor, it is almost a certainty that this milk is in some way the cause of the outbreak. Very often, the milkman whose ware is finally decided to be the cause may have only a little more than half the total cases among his patrons. Conversely, Pease, (American Journal of Public Hygiene, February 1st, 1910) states that in one instance, a milkman having something over half the cases was wrongly suspected, until it was learned that he served about half the community. It is obvious that in a non-localized outbreak, or in so-called endemic cases extending over a period, if the milk supply is innocent, the percentage of cases will fall approximately parallel to the percentage of people served, about ten per cent. of the cases occurring on the route of a man serving ten per cent. of the community.

The exact proportioning of the cases to the percentage of people served, is very seldom realized. In Chapin's paper on the "Control of Milk-Borne Epidemics" in the American Journal of Public Hygiene, February 1st, 1910, he states that the limits of error are vague, various authorities quoting various limits, apparently without other guide in the selection than their own opinion. They seem also to have taken some fixed limit of error, whereas it will be shown that the error is variable, and dependent both upon the number of cases under consideration, and upon the percentage of population served by the dealer. It is in an effort to discover the laws governing this variation, that this paper, a purely mathematical one, is attempted. The discussion is based on the theory of probability, and no exercise of personal opinion is demanded of, or permitted to the writer, save in the single point as to the degree of probability which may be considered practical certainty.

Before passing to the general problem presented, a little preliminary discussion on probabilities as applied to the subject in hand, may be appropriate. Suppose a dealer to serve 25 per cent. of the population, and a case of typhoid, unconnected with the milk supply, occurs in town. The probability of its being on his route will be one in four, or .25, and that of his route escaping it will be three in four, or .75. If five cases arise, there are six events which can occur; 1st, he may get them all, 2nd, he may get all but one, 3rd, all but two, etc. . . . 6th, get none. The probability that any one of these events will occur, is expressed by the appropriate term of the expansion:

$$(p+q)^5 = p^5+5p^4q+10p^3q^2+10p^2q^3+5pq^4+q^5.$$

where p = probability of his route getting an isolated case, and q = probability of its escaping. The tabulated values of these terms are as follows:

1st.	—.00098	Probability that all cases are on his route.
2nd.	—.01465	" " 4 " " "
3rd.	—.08789	" " 3 " " "
4th.	—.26367	" " 2 " " "
5th.	—.39551	" " 1 case is "
6th.	—.23730	" " no cases are on his route.
	1.00000	

This table shows that the chance is negligible that all cases will occur on his route, that it is best that he will have one case, and that the chances of his having two or escaping altogether are nearly the same, namely, about one in four. The probability that he will have either no cases, or one case, or two cases is the sum of the last three terms, and its value is about nine in ten, (exactly .8923) showing that the chance is very good that if his milk is in no way connected, he will not have more than two cases among his patrons. The sum of all six terms is seen to be 1.00000, agreeing with our "common sense" knowledge that some one of these possible outcomes is certain to happen.

Having gone briefly over the elementary considerations of the theory of chance as applied to the distribution of cases, an attempt will be made to solve the general problem. It is manifestly impossible to state mathematically that it is certain that any possible event will or will not occur; but it seems reasonable to call an event having a probability of nine in ten, practically certain. For example, going back to the hypothetical milkman, the probability that he will serve either none, or one, or two, of five cases of non-milk-borne typhoid, is, as was shown, about nine in ten. But it is possible to state that it is absolutely *certain* only that he will serve either none, one, two, three, four or all five. If nine in ten (.9) then, be called practical certainty, the problem is:—If a dealer serves a certain percentage of the community, and a number of cases of infectious disease arise, what is the number of cases practically certain not to be exceeded on his route if his milk is in no way connected with the outbreak?

When the number of cases is small, it is not too laborious a matter to

TABLE OF LIMITS.

Based on Assumption that a Probability of .90 or over, Constitutes Reasonable or Practical Certainty.

Number of Cases	Per cent of population served.										
	1	2	3	4	5	10	15	20	30	40	50
10	1	1	1	1	1	2	3	4	5	6	7
20	1	1	2	2	2	4	5	6	9	11	13
30	1	1	2	2	3	5	7	9	13	16	19
40	1	2	3	3	4	7	8	12	17	21	25
50	1	3	4	4	5	8	12	15	21	26	31
75	2	3	5	5	7	12	16	21	29	37	45
100	3	4	6	7	9	15	21	26	37	48	58
200	5	7	10	12	15	27	38	49	71	91	112
300	6	10	14	17	21	38	55	81	103	133	164
400	8	13	18	22	27	50	72	93	135	176	217
600	10	17	24	31	39	72	104	136	198	259	320
800	13	22	32	41	50	94	136	178	261	342	424
1000	15	27	39	50	62	116	152	221	323	424	526

determine the value of each term of $(p+q)^n$, and then to add enough terms to both sides of the maximum term to bring the probability up to .90 as was done in the example cited above. This method was employed in the determinations of the limits as shown in the table, where the number of cases is less than 50. Where the number is great, this method would be laborious in the extreme, with no commensurate increase in accuracy over the method about to be briefly described.

Bernoulli's Theorem is a rapid and highly approximate expression for the above summation when the number of cases is large; it is written thus:

$$R=2\sqrt{\pi}\int_0^z e^{-z^2}dz$$

In this expression "R" is a probability, (in this case .90), "e" is the base of natural logarithms and "z" is an abbreviation for, $a\sqrt{2np(1-p)}$ "p" is the probability of the route getting an isolated case, and is equal to the percentage of the total population served. "n" is the total number of cases, and "a" is the number of cases in excess of the most probable number. That is, if a dealer's pro rata of cases is 40, and $a=4$, it means that it is a 9 to 1 wager that the cases on his route will not exceed 44 unless his milk is at fault. From a table of the values of the above integral in Merriman and Woodward's "Higher Mathematics," it is found that for $R=.90$, $z=1.17$. Hence, $a=1.17\ 2np(1-p)$. It was from this formula that the limits shown in the appended "Table of Limits" were calculated, when the number of cases exceeded 50.

Leaving the field of pure theory, and turning to that of practical health work, how can these principles, and the table deduced from them, be made to contribute toward the ascertainment of truth? The table is assuredly not intended to supplant judgment, but if applied intelligently, it should afford a reasonable criterion for stating that a certain milk supply is open to suspicion. For example, a dealer supplies 12 per cent. of the community, and 30 cases of infectious disease appear, 6 of which are among the customers of this dealer. It should not be hastily concluded that this man's milk is connected merely because his theoretic or most probable pro rata would be 4, since the theory of probability allows him 6. But suppose the number of cases to be 350 and that he had 70 of them on his route. In these circumstances, the investigator would be justified in looking a little askance at the supply, for the table shows that there is little probability that the accidental number of cases on this route would be more than 52.

The significance of the table may be briefly summed up thus:—If a given milk supply is not connected with the cause of the cases of infectious disease under consideration, it is "practically certain" that the number occurring among the consumers of this supply will not exceed the figure as given in the table of limits.

These principles, it would seem, might advantageously be applied to the statistical study of all the cases occurring, say, in a year, as well as, or perhaps even better than to the investigation of an outbreak.

Received for publication, March 14

BOOK REVIEWS

"The Control and Eradication of Tuberculosis. *A Series of International Studies.*" *By Many Authors. Edinburgh and London, William Green & Sons.*

The most remarkable publication with reference to tuberculosis that has thus far been issued is a "festschrift" volume issued in honor of Dr. R. W. Philip of Edinburgh. He is the pioneer in tuberculosis work, who twenty-five years ago in his home city outlined the first definite, comprehensive campaign against the disease. In celebration of the quarter centennial of this foundation, the pupils and friends of Dr. Philip, scattered as they are in the four quarters of the globe, have gathered that which is historical, that which is new and best of all that which is true, and in his name and his honor have issued and dedicated the memorial volume, "The Control and Eradication of Tuberculosis." From everywhere come the articles in this symposium, there are findings of the conditions in the antipodes, in South Africa and India, not forgetting Great Britain, the Continent, the United States and Canada. There are stories of the development of the Edinburgh system, considerations of best methods, of fundamental principles, of prophylaxis and of treatment. Authorities on every hand have been the writers of the sketches that make up the bulky volume. It is edited by Halliday G. Sutherland, M.D., Medical Officer to the St. Marylebone Dispensary and there are more than thirty other contributors, ten of whom have gone from the Royal Victoria Hospital in Edinburgh to other institutions and other lands. George J. Adami, professor of Pathology at McGill University outlines the situation for Canada; Hermann M. Biggs for New York, Vincent Y. Bowditch for Massachusetts, Lawrason Brown for the whole country and Arloing of Lyons, Bauer of Neuchâtel, Béraneck of the same city, a trio of Scandinavians, Nikolsky, Secretary of the Russian League, Carrière of the Swiss Federal Sanitary Service, etc., contribute each his story from the point of view of his own country.

In a consideration of the Edinburgh system, Dr. E. Béraneck of Neuchâtel in recounting its history notes that before the actual cause of tuberculosis was known, it was recognized that the malady was favored by concentration of human beings and the deplorable hygienic conditions under which such concentrations are obliged to live. Since the time of Koch's discovery, physicians have a clear idea of how this mocro-organism multiplies under the favorable atmosphere of a defective hygiene.

Scotland was the first to organize a systematic anti-tuberculosis campaign, and Dr. Philip was the originator of that crusade. At a time when the attitude of the public bodies in Europe was strongly marked by inertia, Dr. Philip saw clearly that the struggle must be carried on by social organism, and with Dr. Philip rests the honor and credit of the conception and realization of a complete equipment against tuberculosis. This was in 1887. The Edinburgh system now approaches perfection and may well serve as a universal model. It was in the initial year that Dr. Philip created the new institution, "The Anti-tuberculosis Dispensary," which has been of so much importance. From the beginning he invested this dispensary with its prophylactic offices, and thus constituted it the first of the operations against tuberculosis.

"The creation of this dispensary merits of itself the gratitude of the civilized world," writes Dr. Béraneck, "but in the struggle against the disease Dr. Philip was not content to rely on that one institution alone, however great its actual value." From the year 1887, with singular clear-sightedness, he faced the social problem of tuberculosis; he made it depend on the dispensary, the sanatorium for indigent curable cases, the hospital for advanced cases, and the farm colony for convalescents; to which must be added such measures as notifications, assistance to impecunious workers and their families, etc.

These are the great foundation-stones of intelligent anti-tuberculosis movements.

The next step in the Edinburgh work was the establishment of the Royal Victoria Hospital on an original plan, admirably adapted for aerotherapy. Here was built up the system of small pavilions and here they were made capable of housing sixteen patients, each building being raised from the ground on short pillars, and so arranged in plan and exposure as to admit the maximum amount of air and sunshine to all parts equally.

Dr. Philip has always been an advocate of the open air life and good nourishment, and has worked along these lines. Without denying the importance of climate in the treatment of consumption, he considers that the prime factors, air and food—are usually obtainable within easy reach of the majority of the poor, who are thus better kept under surveillance. For this reason the Royal Victoria Hospital was placed at the gates of Edinburgh, and its results are in no way inferior to those of elevated sanatoria in so called irreproachable climatic conditions. The situation also is convenient for the reception of out-patients, where they may benefit during the day by open-air and good simple food, and in the evening return to their homes. Edinburgh has already justified its anti-tuberculosis equipment in a decreased mortality of forty-two per cent. during the decennium 1897–1906, and says Dr. Béraneck, "The pioneer of this world-crusade against tuberculosis may well be proud of such a result."

The writer has such faith in the Edinburgh system that he believes if it were universally applied, the extension of the disease would be prevented and within a measurable time it would become extinct. Dr. Philip thinks that public bodies, especially municipalities should organize a campaign, for it is only the large bodies which possess sufficient resources to work along the Edinburgh lines. At the same time, the towns should hardly adopt an inactive policy because of their financial weakness. Dr. Philip suggests co-operation between state, municipality and private corporations, which unfortunately does not yet exist, for in many countries the anti-tuberculosis movement is still incomplete and badly co-ordinated. Public education is very necessary here, because municipalities are too often satisfied that they have fulfilled their duties when they have equipped a single one of the four or five necessary factors. Germany declared the sanatorium to be the one and only method, but has realized its insufficiency, and has completed the equipment on the lines of the Edinburgh system, while in Switzerland much yet remains to be done before the system will be complete in the populous industrial cantons.

Dr. W. Leslie Lyall, now at the Royal Victoria Hospital, takes up the story here where the previous writer left it, noting some of the matters quite in detail. Graduated labor is a feature of the treatment at the Hospital, which ranges from light tasks such as raking dead leaves, to carrying heavy loads or digging. The occupation serves a double purpose—it keeps the patient from becoming restless and fits him gradually for returning to his ordinary work. The idea has been tested here through many years and has been attended with the happiest results.

The next important event in the history of the Edinburgh method was the adoption of notification of pulmonary tuberculosis, suggested as long ago as 1890. It waited fifteen years before public opinion justified it, and in 1905 a scheme of voluntary notification was adopted by the public health authorities, followed two years later by compulsory notification. This was the first assumption of responsibility by the municipal authorities, and was shortly followed by another step of great importance and preventive value,—the care of advanced cases. Cases taken to the hospital are dangers removed from the community.

The farm colony has been the latest of the links in the Edinburgh system, which gives to the patients who require it a lengthened period of supervision before returning to ordinary life. The work is graduated and of ordinary farm nature, raising produce or rearing poultry and pigs.

Dr. D. J. Williamson, medical officer of the Paddington Tuberculosis Dispensary, is the authority who considers in detail the relations of the dispensary to the war against tuberculosis. The importance of the movement may be judged from a few facts like these, that with the exception of the Edinburgh Dispensary founded by Dr. Philip in 1887, its application to tuberculosis is entirely a twentieth century production, and that several hundred dispensaries are now in existence in the greater countries of the world. The view that Dr. Philip took in the beginning emphasizes the importance of considering the whole problem in all its aspects. He insisted that the cure of individual patients cannot be the one and only object. Tuberculosis is so intimately bound up with the evils of civilization, poverty, drink, overcrowding, and the like, that any method to be successful must be carefully thought out and must take into consideration the social problem. A complete organization is necessary and this dispensary should be the headquarters for the organization. It will be situated in the heart of the district affected and should be the clearing house for that district. The poor will come there first for advice, and the information gained from them and about them will be of use at the other institutions, sanatoria, isolation hospitals, and surgical hospitals, etc. It should do more than this, and carry out an aggressive search for unsuspected and early cases. There should be an organized system for examining the relatives of those already affected, and other means of discovering the disease, which will be developed in the investigation of known cases.

It is true that while making full use of all other means there will still remain the great mass of tuberculosis patients who must be treated at their homes. The dispensary is the institution to do this, because it is the only one which can treat them efficiently in relation to their home conditions. Furthermore there is the co-operation with the charitable agencies and the public health authorities. In brief the larger functions of the tuberculosis dispensary include the supervision and improvement of home surroundings, the search for incipient cases, the sorting out of different classes for appropriate treatment, the treatment with due regard to the home conditions of the great majority of the patients, and the collection of most valuable information and statistics.

The Royal Victoria Dispensary was established only five years after the announcement of Koch's discovery of the tubercle bacillus at the time when preventive measures elsewhere were either non-existent or still in their earliest infancy. The program here evolved includes the routine work of reception and examination, history and record of every case, bacteriological examination of sputum and other discharges, instruction of patients how to treat themselves and how to prevent or minimize the risk of infection to others, and the dispensing of necessary medicines and appliances and where the patient's conditions seem to warrant of it, food stuffs. There is further the visitation of patients at their homes by a qualified physician and by a district nurse, the latter of whom looks to the following of the treatment and makes an investigation into the conditions of life and habitation and the risk of infection to others. The dispensary further sorts the patients and furnishes information to them and their friends on every question concerning the disease. Dr. Williamson further outlines the dispensary movement in various countries. That in France began by the Préventorium Emile Roux which was founded by Professor Calmette at Lille in 1901. The name is chosen deliberately by Professor Calmette to accord with what he considers its chief functions, prevention. Within four years fifty dispensaries of a similar nature were established in France. The establishments do not, however, give medical treatment, and Dr. Williamson notes that the functions of a tuberculosis dispensary as understood in England and America are hardly realized in France at all, for the majority of French dispensaries are little else than relieving agencies. They lack uniformity of methods, some of them exercising a certain amount of home supervision, but there is no attempt to discover incipient cases, nor much medical supervision of the home conditions. In Germany, on the other hand, with the first dispensary opened in Berlin in 1904, the various institutions do form a definite part of a large organization and are themselves linked together in aims and methods. There is an attempt to examine the contact cases and the homes are visited by trained nurses. There is no treatment given, but considerable material assistance. But in Germany there are conditions of invalidity insurance, which provide for medical treatment.

Of the United States, Dr. Williamson has only good words to say. The first dispensary or clinic was opened in New York in 1904. The Edinburgh ideals are carried out, and Boston receives honorable mention for its organization and activities. Canada is also active in the dispensary movement. England, on the other hand, has been rather conservative in the matter; the first institution in London being now only three years old, and by a private enterprise. There is now, however, a central fund for financial support of the poorer districts desiring to start such institutions.

"One of the important values of the sanatorium," writes Dr. J. J. Galbraith, of the Ochil Hills Sanatorium, Dingwall, "is in its educational advantages. The patient must learn to minimize the chance of being a center of infection to others. He must be taught the manner in which the disease is communicated, and the dangers of coughing, spitting and kissing, and the care necessary to prevent infection through handkerchiefs, linen and table utensils, which he may have occasion to put near his mouth." He learns also how to regulate his own life; he learns the proper intervals at which to take food, and the proper food to take both as regards quantity and quality; he learns the necessity of open air night and day, as a remedial agent and as a stimulant to his general health. The most difficult things to do, however, are to disabuse the mind of the patient of legendary fallacies, such as that sitting in a current of fresh air will be followed by a cold.

The question is often asked why send a patient to a sanatorium if he can treat himself at home; and if what is perhaps the most crucial period must be spent at home? The reason lies in fact that the average home life is not hygienic, and that the patient must be taught to counteract it by regular and systematic instruction under proper supervision

The sanatorium methods of treatment are further considered by Dr. Sutherland himself, referring to Hipocrates, who advised long rides on horseback, Celsus, who considered sea voyages beneficial and Laënnec, who commended life by the seashore. "Pure air is the first essential of aerotheraphy," writes Dr. Sutherland, "it is not so much the question of changing the environment of the patient from the city to that of the mountain, sea or desert, as that the poisoned atmosphere of the ill-ventilated sitting room and bedroom should be abolished, and the patient exposed to the free atmosphere whether of city or of country." Dryness and changes of temperature are minor considerations, and it is possible to carry out the open air treatment even in the midst of a great city. It is well to emphasize this, for change of climate does not always mean change from the unhygienic to the hygienic life. At a health resort oftentimes there is continually a life crowded with social excitement, and it would be better for the patient had he remained in the city, living with open windows. Dr. Sutherland criticises the construction of many shelters in that they are built with a view to keep out the rain while the first consideration should be to let in the air. Moreover in some of them the amount of air entering can be controlled by the patient, and if windows are closed it certainly can be converted in to a hot room with little or no ventilation.

With reference to the theoretical and practical basis of tuberculin in treatment Dr. Béraneck notes that in spite of much research during the years that have elapsed since Koch's discovery of tuberculin, but little is known of its chemical composition, of its mode of action, of the degree of immunity that it confers upon man or animals. The writer discusses toxins and their relatives and enemies, speaks specially of the re-actions of the body and the curative process. The latter is the story of preparing the invading bacteria for destruction by the phagocytes. The bacteria have in their special secretions, liberated when they die, substances that tend to paralyse the action of the phagocytes. If the individual is to live, the leucocytes must be able to meet the conditions established by the pathogenic bacteria. This is possible only by the predigestion to an extent of the bacteria and their toxins. The tubercle bacillus is digested only with difficulty by the leucocytes of a healthy animal. The endotoxin present in tuberculins is more easy of digestion—by the leucocytes—than are the toxins of the bacilli and it becomes a vaccine. The aptitude of the leucocytes to assimilate the endotoxin of the vaccine differs in different species, and within the same species, differs in individuals, and this explains the variation in the curative effect of the vaccine. It has not been possible to raise the resistance of the individual save by increasing the apetites of the leucocytes, and the tuberculins that are most likely to be of advantage are those which contain the bacillary endotoxins in most easily assimilable form.

Dr. Edward Bauer carries the story of tuberculin a step or two farther in the consideration of methods of using it and its relations to general practise. The tenor of the paper is to present tuberculin as playing an important role. The writer finds that there is no longer ground for doubt as to the value of its action in the treatment of tuberculosis. The two schools that differ in the method of its application are noted and the author states that "There are still adherents to the methods of inducing a febrile re-action, but it is safe to predict that within the next few years these will become fewer." Those who do not regard the re-action as the most important item in the treatment, are again in two classes, one believing in regular progressive doses and the other in the injection of tuberculin in minute quantities. The first group of these physicians watch very closly the clinical records for any re-actionary phenomena.

The serious question is brought up by Dr. Bauer, whether tuberculin should be used in general practise. The consensus of opinion tends unmistakably to the negative, but this authority believes that a judicious consideration of individual cases is preferable to the veto on the use of it in practise. "Danger can arise only from the inexperience of the practitioner or from insufficient observation of the patient. Tuberculin is a two-edged tool. It is therefore necessary that the physician should be aware of the risk of its improper use." Every practitioner ought to get in the literature the necessary facts and in addition to certain theoretical knowledge needs only prudent and conscientious action.

The problem of dieting, one of the most important that the physician caring for tuberculosis has to consider, is treated briefly in this Festschrift volume by Dr. John Malcolm of Dunedin, N. Z., and Dr. Galbraith. The story beings with the use of cod-liver oil, which established a new period in the treatment of tuberculosis, in that it showed that nutrition is after all the determining factor to the progress of the case. The earlier method however defeated its own ends in the virtual confinement of the patient and the failure to realize the value of fresh air. Of late years forced feeding has been abandoned in favor of a balanced ration suited to the disease and the individual, a selective diet, this treatment being distinguished by the name, "zomotherapy." A conspicuous factor of the success of the Edinburgh method of Dr. Philip lies in its consideration of the digestive phenomena. The different qualities of the digestive secretions and the action of the stomach are noted by these authors, raw meat producing a large amount of secretion acid in its nature which does not last long for it digests the food rapidly. Fatty food depresses the gastric secretions but calls forth a pancreatic juice with a stronger fat-splitting ferments, starchy food causes a flow of saliva, while raw eggs taken on an empty stomach stimulate no secretions but pass on to be absorbed in the intestines.

The chapter on the open-air school, by Drs. E. Goss and Sutherland, touches a matter which is of the greatest interest and importance to investigators in this country generally. The matter is considered here in two sections, first the open-air school for tuberculate children and next, the need of more fresh air in all the schools. First there is noted the amount of tuberculosis that exists among school children and this has been variously estimated, the clinical examinations agreeing pretty well at about one-third of one per cent., while the re-actionary tests rise as high as 20, 40 and even 80 per cent., the higher figures ophthalmic and cutaneous re-actions. From post mortems the percentage has been determined at from eight to nearly fifty per cent.

The two varying opinions are noted one that tuberculosis mortality while great in the first year is less in succeeding years of childhood. Later figures do not however bear this out. The authors state that the constant difference between the clinical and the biological tests is due to the increased accuracy of the method of examination. The re-action method will give positive indications even for a small lesion in a remote portion of the body. Its value is enhanced whenever clinical methods are able to locate the seat of the lesion. These authorities note some misuse of the figures of tuberculosis among children. Some argue that if thirty per cent. of children have the incipient disease, this degree of infection must cease to have any practical significance, and on the other hand if so many children re-act to tuberculin tests before entering school, the school really has little part in the dissemination of the disease. "No one has ever suggested that thirty per cent. of the children should be removed from school and placed in sanatoria," writes Drs. Goss and Sutherland, "but we do hold that as each of these children is a possible case of advanced tuberculosis, the conditions of childhood and especially of school life should be such that resistance against the disease is increased."

Progress here may be along two lines, refinement in the methods of diagnosis and improved conditions of aeration in the schools. It was Dr. Philip who first called attention to the increase in mortality from pulmonary tuberculosis during school life, "Evidence is rapidly accumulating," he writes, "that it is especially during childhood and school life that the tuberculous seed finds a nidus." And he goes on to say that the exact figures are a crying need not only for scientific purposes but for social.

Open-air schools are to be considered both as prophylactic and curative agencies. A realization of the truest conception would mean that every schoolhouse should be a prophylactic force, while as curative agencies, open-air schools will have their value not only for tuberculosis but for other general diseases. The open-air school for general benefit to the children dates from that at Charlottenburg in 1904, but the school for tuberculous children is another and a later development of the idea. It formed an integral part of the Edinburgh plan and here there is now the consideration of its extension.

The place in the general plan of the farm colony is considered by Dr. A. H. Macpherson, physician at the Edinburgh colony, who finds that the patient is restored to his place as a working unit at an earlier date than is possible otherwise without risk of relapse. He is moreover taught some new occupation under favorable conditions. The colonist is hardened physically and the conditions under which he works are the most advantageous for the overthrow of the tubercle bacillus. Then again the return of these individuals to the productive community has most beneficial effect on his future.

In a consideration of the relations to the general movement of the hospital for advanced cases Dr. A. Maxwell Williamson notes the responsibility of the municipality, the necessity for notification as in other infectious diseases and the problem of the advanced cases. In Edinburgh the Royal Victoria hospital has accomplished the highly desirable end from the preventive point of view, of diminishing the number of deaths occurring at patients' homes from 73 per cent. to 51. This means that one fifth of all the deaths from the disease occur in this hospital with all that the excellent conditions of such an institution present in the way of the prevention of the spread of infection. In addition to the great hospital for advanced cases there has been developed at Edinburgh a type of shelter for such patients, which experience has shown has justified the expectations that preceded it, a revolving shelter for two patients. Each of these little shacks has open front, windows at side and rear, there is no inner partition, and the ability to move the shelter about gives chances to take advantage of the best exposures and directions of wind. The shelter is mounted on a great mill-stone of concrete. These little rooms are ten feet by nine and the cost of each shelter is only $115.

One of the interesting features of the hospital will be found in the statistics, the percentage of mortality being 56 of which more than three-quarters died within three months of admission. This large number had been removed and housed and their activity stopped as active foci of infection.

The story then passes on to an almost world-wide presentation of conditions, which it is here impossible to give in more than the most cursory notice. "Canada, happily less disturbed by tradition and old institutions," writes Dr. J. G. Adami, "can take the direct course." In South Australia according to Dr. J. Ernest Good, the climate does much and there is no such overcrowding of cities, still it is the most important infection and the authorities have taken sensible measures, recognizing that education is the most important factor towards preventing the spread of the disease. In South Africa the problem is complicated, by the different races and colors. Primarily a disease of the native and colored populations it is now interesting the whites through the contact between servants and their masters. The situation here is outlined by Dr. David P. Marais. In India, according to Dr. E. W. D. Grieg, student under Dr. Philip and assistant, there are the social difficulties arising from caste. The disease is more frequent among the Mohammedans than with the Hindus and much more prevalent among women, as might be expected. In India the people do not recognize the danger from expectoration and sputum is left everywhere to dry and disseminate.

In like manner eminent local authorities have reviewed the conditions in the United States, New York, Massachusetts, Pittsburgh, and in the Continental states including Russia, the Teutonic countries, Italy, Scandinavia, Denmark and in Switzerland, the whole making a most remarkable and timely counting up by men fitted to do such counting of conditions and resources.

John Ritchie, Jr.

"Sewage Sludge."

By Kenneth M. Allen and others. 272 *pp.*, 42 *illus.*, $2.50. McGraw, Hill Book Co. New York.

Sewage Sludge. Treatment and Utilization of Sludge, A. Elsner; *The Drying of Sludge*: F. Spillner; *Operation of Mechanical Sewage Clarification Plants of the Emscher Association*, F. Spillner and Blunk; *Sludge Treatment in the United States*, K. M. Allen.

The handling and disposal of sludge still remains the most difficult problem in sewage purification. Mr. and Mrs. Kenneth Allen and Mr. Kuichling have done good service in translating three important German papers (originally published in the Fortschritte der Ingenieurwissenschaften [1910] in the Mitteilungen aus der Königlichen Prüfunfsanstalt für Wasserversorgung und Abwasserbeseitigung [1911] and in the Technisches Gemeindeblatt [Volume XIII] and in adding to them a review of practically all the important work done in regard to sludge disposal under American conditions.

Doctor Elsner's paper includes an admirable general discussion of the nature of sludge, the removal of sludge from clarification tanks, the reduction of water in sludge and its final disposal. English and German results are thoroughly reviewed, the slate bed of Dibdin being the only important device not discussed. Valuable tables indicate the amounts of sludge likely to be produced by various processes and the construction of tanks and the automatic devices which facilitate sludge removal are discussed. Data in regard to the areas of land needed for sludge disposal should prove useful and the use of tarry products for preventing putrefaction and the breeding of insects in sludge during drying is well worthy of the attention of American engineers. For final disposal the author concludes that air drying is usually cheapest, followed by pressing, centrifugal drying being most costly although local conditions must determine which is most suitable for any given plant. It is assumed by the author that sludge properly rotted out in septic or Imhoff tanks should prove inoffensive in drying. Sludge may be burned with success only after its moisture has been reduced to 80%. When ground lignite has been added to the sewage, along with alum and copperas for precipitation, burning is very successful. The conclusions of the author in regard to the recovery of valuable elements from sludge is generally unfavorable. Even at Bradford, with half the sewage coming from woolen mills, it takes $59,000 worth of sulphuric acid to recover $29,000 worth of grease.

Removal of Suspended Solids by Different Methods of Treatment.

Method.	Per cent. removed.	Cubic yards Sludge per million gals. sewage.	Per cent. Moisture.
Bar screens, 3-4 in. to 1 in.	2—10	.1— .25	65—75
Mesh screen, 1-4 in. or less	15—25	.6—1.4	80—90
Grit chambers	5—10	.1— .8	35—50
Plain sedimentation	50—70	4.0—7.0	87—93
Septic Tanks	50—70	1.5—3.0	80—90
Imhoff Tanks	50—70	1.0—2.0	75—85
Chemical precipitation	75—90	20.0—25 0	86—92

The papers by Doctor Spillner and Mr. Blunk begin with a review of various methods of drying sludge and pass to a discussion of the results obtained from Imhoff tanks at Bochum, Essen and Recklinghausen, and particularly from experimental drying beds at Essen. The Imhoff sludge, as obtained from the tanks, contains 70–80% of moisture and has already been compacted to about 15% of the volume of fresh sedimentation sludge. Such sludge dries out very quickly on a clinker bed, becoming spadable in six days, its volume being reduced thereby about 25%. Each bed takes a depth of 20 feet of liquid sludge in a year.

Mr. Allen's review of American experience is very complete and includes all the important experimental and operating data obtained in regard to detritus removal, screening, sedimentation, septic action and chemical precipitation at Boston, Columbus, Worcester, Philadelphia, Waterbury, Reading, Providence, Pawtucket, Andover, Mansfield, Plainfield, and other cities. For the operation of the Imhoff tank under American conditions the experiments at Philadelphia and Chicago are of special significance. So far as disposal of sludge is concerned the most important results of course relate to air drying and mechanical pressing. In regard to the freedom of the Imhoff sludge from objectionable odors of decomposition, Mr. Allen makes the point, new to the reviewer, that the most offensive parts of the organic matter from which hydrogen sulphide is generated, being in solution or fine suspension, may not settle out at all in this type of tank, but may pass out unchanged after the comparatively brief storage period allowed.

The table above is of course only of general application and subject to many individual deviations. It seems sufficiently valuable, however, to be reproduced here as an indication of the gravity of the sludge problem with which these collected papers deal.

C.-E. A. Winslow.

PUBLIC HEALTH NOTES

Dr. G. H. A. Hansen.

"The death is announced, at Bergen, of Dr. G. H. A. Hansen, whose name will always be associated with the discovery of the bacillus of leprosy by him in 1871. This was almost the first micro-organism associated with disease to be recognized, antedating Koch's discovery of the tubercle bacillus by ten years. Hansen regarded leprosy as a malady of an ordinary bacterial type, and he therefore hoped for the complete extinction of the disease by the segregation of the sufferers. With this end in view, he took an active part in the organization of leper hospitals in Norway, and although his hopes have not been completely realized, these measures have considerably diminished the prevalence of leprosy in Norway. Notwithstanding the bacillus of leprosy was recognized forty years ago, it is only within the last year or two that the artificial cultivation of the organism has attained any measure of success."

Nature, February 22, 1912.

Cultivation of the Leprosy Bacillus.

The following from the *Lancet* of March 16, 1912 is of general interest. The writer, however, appears to be unfamiliar with the work of Duval in this country.

"It is satisfactory to find that the most refractory organisms are gradually yielding to the seductions of the bacteriologist, and submitting to cultivation in the laboratory. For a long time failure attended all attempts to grow the bacillus of leprosy on artificial media, but recently several successful cultures have been recorded. One of the most notable of these was effected by Clegg, who grew the organisms along with amœbæ and cholera vibrios. This method has recently been successfully applied by Hollmann to the bacillus of rat leprosy, which has been supposed to be identical with the bacillus found in the human disease. This identification is, to some extent, supported by the susceptibility of the two organisms to the same mode of culture. Reinoculation of Hollmann's cultures into healthy rats did not, however, produce any visible lesions, though acid-fast bacilli were found after death in the tissues of the animals, and in view of the ubiquity of acid-fast organisms it is difficult to be sure of the identity of any grown in a mixed culture. If the bacillus of rat leprosy is really the B. lepræ, the interesting question arises as to the possibility of transmission of the disease to man by these rodents. So far no evidence of such transmission appears to exist, and it is difficult to imagine a condition of sufficiently close contact between man and rat to lead to infection with the causal agent of so chronic and slightly contagious an infection. An intermediary, such as the flea, is, of course, possible, and it is important to ascertain whether fleas can carry infection from rat to rat. In any case we are justified in feeling that light is beginning to dawn on the causation of leprosy and in anticipating further discoveries of importance in the immediate future."

Telephones and Tuberculosis.

"Statements have frequently been made as to the possibility of the transmission of tuberculosis by the mouthpiece of the telephone. At the instance of the postmaster-general an exhaustive investigation has been carried out with the result that it has been conclusively proved that there is no ground for alarm. The investigation was carried out by Dr. Spitta of St. George's hospital, bacteriologist to the king. A number of telephones which have been in use at busy call offices in London for various periods of time and had received no special cleansing treatment other than that normally given were examined. Washings were prepared from the mouthpieces and tests were made by the inoculation of guinea-pigs to ascertain the presence of tubercle bacilli. The results in all cases were negative. Further experiments were made with telephones which were known to have been exclusively used by persons suffering from pulmonary tuberculosis. For this purpose telephones were fitted in the wards of a sanatorium and used only by patients in different stages of pulmonary tuberculosis for varying periods of time and not in any way cleansed or disinfected. The results again were entirely negative. Dr. Spitta, therefore, concludes that the transmission of tuberculosis by the telephone mouthpiece is practically impossible. These results confirm the researches carried out by Doctor Klein at St. Bartholomew's Hospital in 1905."

London Letter Journ. A. M. A. Vol. LVIII. No. 14.

Flies and Infantile Diarrhœa.

"Dr. John Brown (M.O.H., Bacup), has come out as a defender of the house-fly, which he considers has been unjustly condemned as the chief cause of infantile diarrhœa. Our experience he writes, does not bear out this as the source of the disease. In one part of the borough where the fly nuisance has been the worst, there have been no deaths from diarrhœal diseases for several years past. They have been a nuisance as filth *carriers* and *irritants*. Where-ever the ground temperature is high you have infantile epidemic diarrhœa. The conditions which favour the high ground temperature also favour the multiplication of flies. The presence of flies is an indication that decaying organic matter is present and should be removed. Horse manure is one of the best breeding place for flies, and should be removed weekly. Where this is difficult, then a few fowls, about five for each horse, will effectually prevent the fly nuisance."

Medical Officer, March 30, 1912.

Laws on Reporting Communicable Diseases.

A publication of the greatest service to public health workers has recently been issued by the United States Public Health and Marine Hospital Service. It is entitled, "A Digest of the Laws and Regulations of the Various States Relating to the Reporting of Cases of Sickness," by Dr. John W. Trask, Assistant Surgeon General, and is known as Public Health Bulletin No. 45.

The states are arranged alphabetically, and under each state is given first of all data concerning the composition of state, county and municipal health boards and commissions. The powers of medical societies with reference to reporting of disease are also stated. Then follows, under each state, a brief, but comprehensive digest of all state laws and regulations with reference to the reporting of cases of sickness. Mention is also made of court decisions where these have a bearing upon the matter. A special section of the report discusses under each state certain features peculiar to the various state and territorial laws. In addition to an extended tabulation showing what diseases are reportable in each state the bulletin concludes with copies of laws in different states under which reporting of sickness is required.

New Jersey Sanitary Association.

The Proceedings of the 37th Annual meeting of this Association have recently been published. Amongst others the following papers are reproduced.

The Responsibility of Local Boards of Health to the Community; Plea for More Uniformity in the Local Health Code—Edward Guion, M.D., The Public Schools and Health—Calvin N. Kendall, Ph.D., Program of Campaign for the Prevention of Tuberculosis in New Jersey—A. Clark Hunt, M.D., The Moral Phase of the Social Evil —Rev. Herbert M. Gesner, Municipal Refuse Disposal—Samuel A. Greeley, C.E., Progress in the Control of Animal Infection in the State and Its Relation to Public Health—H. E. Stearns, D.V.S., Some Features of the Larger Water Supplies of the State—Morris R. Sherrerd, C.E.

Sanitation in Southern Cities.

Dr. Charles A. Mohr, City Health officer of Mobile, Ala., contributes a forceful article on this subject to the Southern Medical Journal for February, 1912. A strong plea for better sanitary work is made. Doctor Mohr concludes as follows:

"The elevation of our cities to high sanitary planes is not an academic question to possibly be solved by posterity some generations hence. It is the most important question of the day, to be solved immediately; it is merely a financial question, one of dollars and cents, nothing more, nothing less. If not already done, the matter should be put to our people in no uncertain terms and clearly put, so that he who runs may read. Then let the people answer.

"What greater asset from a commercial and moral point of view can there be than the record of a low death rate and a reputation for healthfulness? What greater boon than good health? What factor in our daily lives contributes more generously to the peace, welfare and happiness of a community than good health and wholesome, sanitary and healthful surroundings? The only means through which we can possess ourselves of this blessing is, Modern, Scientific, Aggressive and Progressive Sanitation."

Carbolized Sheets.

"The practice of hanging up sheets with carbolic acid or placing saucers of chloride of lime or other disinfectants in the room is not only useless, but annoying to the patient, and perhaps even injurious. The sheet is at best a warning sign that a case of contagious disease is in the room."

Health Bulletin, Toronto, February, 1912.

The Dangers of Carbonated Waters.

Messrs. C. C. Young and N. P. Sherwood, Water Analysts to the Kansas State Board of Health report the results of experiments on the Effect of the Environment of Carbonated Beverages on Bacteria, in the January Bulletin of the Kansas State Board of Health. Bottles of carbonated water with syrup were inoculated with *B. typhosus*, *B. coli* and *B. prodigiosus* and examined after 4, 28, 80 and 240 hours. Control experiments with uncarborated water (but containing syrup) were also made.

The following conclusions are made by the authors:

"1. That the number of organisms outside of those introduced was extremely small.

"2. That there was a decided reduction in number of the organisms introduced, owing to standing 244 hours uncarbonated.

"3. That there was a very marked reduction in numbers of all three organisms introduced, and especially of *B. typhosus*, owing to conditions existing in the carbonated bottles.

"4. That there was not a complete killing out of the organisms introduced, during the entire experiment.

"5. That *B. prodigiosus* and *B. coli* seemed to be somewhat more hardy than *B. typhosus*.

"Undoubtedly the longevity of *B. typhosus* depends in a great measure upon the virulence of the organism, and as the results above show that some of the organisms will live longer than the beverage is normally on the market, the manufacturer should not depend upon the percentage of reduction caused by the carbon dioxide and other substances used.

"From the observation that the most hardy individuals can resist these adverse conditions for a considerable length of time, the logical conclusion is that no water should be used in the manufacture of carbonated drinks that is in the least suspicious, and if a doubtful water is the only source of supply this should be subjected to treatment by some method of sterilization, with subsequent filtration through a trustworthy and efficient filter."

Typhoid Fever Control in New York City.

By inviting a number of eminent sanitarians and physicians to act as an advisory committee, Commissioner Lederle of the New York City Department of Health has taken a progressive step in the study of the control of Typhoid Fever. This committee, which will co-operate with the Department in studying present methods and will suggest improvements, includes Professor W. T. Sedgwick, Professor G. C. Whipple, Professor C.-E. A. Winslow, Mr. D. D. Jackson, Doctor J. W. Brannan, Doctor A. Lambert and Doctor H. D. Pease,—men all qualified by training and experience for the work in hand. The Committee on Public Health, Hospitals and Budget of the Academy of Medicine has also been invited to send a representative.

The first conference of the advisory committee and the officials of the Department was held on February 15th. The city officials explained in detail the present methods of control, and the rest of the meeting was devoted to a general survey of the situation and to the organization of the committee.

Guayaquil, Ecuador.

The danger of this city to the United States, with especial reference to the opening of the Panama Canal, was on February 17th a subject of discussion for two of our leading medical journals. The questionable fame of Guayaquil and its danger to us has now reached England, finding expression in an annotation in the *Lancet* of March 23rd under the flattering heading—"The Pest-Hole of the Pacific."

This city is situated on the western coast of South America about 800 miles from Panama, and possesses one of the best harbors of the Pacific and one of the worst sanitary records. Yellow fever and plague appear to be endemic and smallpox is manifest by frequent and violent outbreaks. Along with generally unsettled political conditions in Ecuador public health administration seems to be at an extremely low ebb, and thoughtful sanitarians will realize that Guayaquil constitutes a real menace to our own country.

Tuberculin and Sanatorium Treatment of Tuberculosis.

A most interesting and suggestive comparison has been made by Mr. J. A. D. Radcliffe, pathologist of the King Edward VII Sanatorium of Midhurst, England, as to the relative value of sanitorium treatment with and without the use of tuberculin. Taking the disappearance of the bacilli from the sputum as the criterion of the successfulness of treatment this author has compared the experience of his own institution where no tuberculin is administered, with that of German sanatoria where tuberculin injection forms a regular part of the treatment. The result of the comparison is all in favor of the German system.

The author summarizes his results as follows:

1. With sanatorium treatment alone we can reckon on 20 to 25 per cent. of all cases losing their bacilli as an immediate result of the treatment.

2. When a combination of tuberculin with sanatorium treatment is adopted, at least 50 per cent. of the cases will lose their tubercle bacilli.

3. The earlier the cases come under treatment the better the results. This is very strikingly shown in the table in which the cases are considered in groups according to the stage of the disease.

4. A comparison of the immediate results is so much in favor of tuberculin that it is difficult to understand the opposition to its employment both in treatment and diagnosis.

The comparisons made seem fair and the paper well worth serious consideration.

Lancet, No. XII of Vol. I, 1912.

Diseases Communicable From Animals to Man.

Professor J. F. Craig, Professor of medicine in the Royal Veterinary College of Ireland has recently enumerated and discussed the diseases which may be transmitted from animal to man.

This author evidently has in mind diseases transmitted to man from *domestic* animals. The belief is expressed that tuberculosis is much commoner in pet animals as cats and dogs than is generally supposed, and that their association with children should be restricted.

For prevention of transmission the most effective measure is extermination of these diseases in the lower animals. Rabies has been eradicated from the British Isles in this way and glanders and foot-and-mouth disease are rapidly disappearing. Other important factors are careful diagnosis and systematic control of diseased animals, and efficient meat and dairy inspection with skilled veterinary assistance. The author believes that the existing English methods of prevention are wholly inadequate and call for immediate attention and revision.—Jour. Royal Inst. Pub. Health XIX 12.

XV International Congress on Hygiene.

Dr. J. N. Hurty, President of the American Public Health Association has recently received an invitation to participate in the XV International Congress on Hygiene and Demography. Doctor Hurty, on behalf of the Association has cordially accepted the invitation. The Congress is to be held from September 23 to 28, the week following the meetings of the Association.

Public Health Service Bill.

Senator Smoot last month introduced into the United States Senate a bill entitled *A Bill to Establish a Public Health Service and for other Purposes.* (S. 5972). The chief points of this bill are to change the title of the Public Health and Marine Hospital Service to the United States Public Health Service; and in addition to the administrative divisions now authorized by law, there is to be created a division of sanitary engineering and a division of child hygiene, and the division of Vital Statistics of the Bureau of the Census is to be transferred from the Department of Commerce and Labor to the Public Health Service. An Assistant Secretary in the Treasury Department is to supervise the administration and general operations of the service, which is to be under the charge of the Surgeon-General of the Service.

Ellen H. Richards Research Fund.

The friends of Mrs. Richards wish to found the Ellen H. Richards Research Fund as a Memorial to her to be presented to the Massachusetts Institute of Technology, with which she was closely connected for over forty years. The income of this fund is to be devoted to the promotion of research in Sanitary Chemistry, the branch of science to whose development Mrs. Richards so greatly contributed. It is understood that the income will be utilized by the Institute for the award of fellowships to advanced students competent to pursue this line of research, for the employment of research assistants, and in such other ways as will best promote investigations in the field in question.

The Committee on the Fund desires to announce that subscriptions have been already received aggregating about $5,500, and that in addition the sum of $1,000 has been pledged with the condition that further subscriptions be secured within one year sufficient to make a total of $15,000. The Committee, believing that the fund should be increased to at least this extent, invites further contributions from those who desire to do honor to the memory of Mrs. Richards, or from those who are interested in the advancement of sanitary science. Such contributions may be sent directly to the Treasurer, Mr. George Wigglesworth, 53 State St., Boston, Mass.,

Milk Supply of Champaign and Urbana, Ill.

Under the guidance of Professor Burt R. Rickards of the University of Illinois, a good deal of attention is being paid to the matter of securing efficient milk ordinances in these two University towns.

A new milk ordinance has recently been adopted in Champaign and it looks as if a similar ordinance will shortly be adopted in Urbana.

In the past the University Dairy has been called upon to supply the demand for clean milk in cases of sickness and for infants. The demand, however, exceeds the supply, and Professor Rickards has had a committee appointed to consider the question of securing a certified or inspected milk for the two communities. The practical value of the University to the State will be especially emphasized in the near future as arrangements have been made to investigate any epidemic apparently due to milk. Besides thus rendering an aid to the community in trouble, steps will be taken to introduce a new milk ordinance or strengthen an old one, and to aid in seeing that it is properly enforced, advantage being taken of the pliable condition of the local authorities while in trouble.

Dr. Carlos J. Finlay.

In the February, 1912 issue of the *Medical Review of Reviews*, under the title of Notable Figures in Present Day Medicine, appears an appreciation of Dr. Carlos J. Finlay, a member of the A. P. H. A. The article in speaking of Doctor Finlay, says in part:

"He was the forerunner of Gorgas, the inspirer of Reed and the rest of that splendid Army Commission. He still lives, and it is pleasant to look upon the features of the greatest of all, though the least praised. Let us hasten to 'place wreaths on the brows of the living.' Reed himself, it will be remembered, said that 'To Dr. C. J. Finlay of Havana must be given full credit, however, for the theory of the propagation of yellow fever by means of the mosquito, which he proposed in a paper read before the Royal Academy in that city on August 14, 1881." The article is accompanied by an admirable pencil sketch of Doctor Finlay.

Boston Health Bulletin.

The Boston Health Department has recently commenced issuing a monthly bulletin. The first numbers have contained articles by Dr. Wm. H. Davis, Vital Statistician to the Board, Dr. William J. Gallivan, Chief of the Division of Child Hygiene, and others. The Bulletin is admirable and should prove of value to the citizens of Boston in keeping them posted in the health conditions of the city and the Departments' activities.

Canal Boats.

"Only a few years ago the influence of the canal-boat population as disseminators of infectious disease was generally considered dangerous to the communities dwelling on the canal banks. But in recent years the canal traffic has been steadily declining, the number of inhabited boats in use having consequently decreased. The dwellers in these boats are kept under better supervision than formerly, and a recent report speaks appreciatively of the co-operation for this purpose of the sanitary authorities concerned. Nevertheless, in some places canal-boat inspection is still perfunctory, the boats being simply observed from the canal banks or the numbers copied from the entries of previous years. Only twenty-six cases of infectious disease have been reported on board the nine thousand one hundred and twenty-one boats used as dwellings during the year, viz., 8 of diphtheria, 5 of scarlet fever, 3 of erysipelas, 9 of enteric fever, and 1 of puerperal fever."

The *Lancet*, March 16, 1912.

Congress on Eugenics.

An International Congress on Eugenics will be held at the University of London from July 24th to 30th, under the presidency of Major Leonard Darwin. An exhibition of charts and objects bearing on human heredity will be held in connection with the Congress.

Scarlet Fever and Schools.

A vigorous protest to the frequent assertion that the aggregation of children in school is the cause "for the continued prevalence of scarlet fever, in spite of the enormous expenditure on so-called isolation," is to be found in a paper presented by Doctor John D'Ewart, Assistant Medical Officer of the Manchester Education Committee, in the March 2, 1912, issue of the Medical Officer (London). Doctor D'Ewart points out "that the yearly incidence of scarlet fever falls into the well-marked tides, an ebb commencing about October and reaching its lowest about August, followed by a rapid rise in the tide of cases culminating about the end of September or the beginning of October." If the rise after the summer vacation is to be blamed to the schools, why should there be such a marked decrease of the disease later on in the school year? Two obvious effects of the closure of the school during the summer are noted: 1. Reduction of child population due to migration of children to the country or seashore (a diminution of 37.93 per cent. in the child population of Manchester was noted), and 2. Reduction of supervision with the resulting failure to find cases which would be detected by the medical school inspectors.

Another important point to explain the

increase of scarlet fever with the opening of schools is that the infection is brought back from holiday resorts. Doctor Chalmers showed that 8.9 per cent. of the scarlet fever reported in Glasgow during the 7 weeks ending August 18, 1910, were undoubtedly due to infections received out of the city.

The danger and fallacy of attempting to determine whether or not infections are more frequent on days when schools are open than when closed is pointed out. The marked variability of the period of incubation of scarlet fever and the possible influence of Sunday schools, which is frequently ignored, are the two factors which render the above method of proving the importance of schools as scarlet fever disseminators, of a very questionable nature.

Doctor D'Ewart points out that "if the charge be true that school-going increases the incidence there should be a big jump in the cases amongst the five-year-olds." This does not appear to be so. "A constantly acting cause should show itself markedly in the curve, yet soon after school-going begins the curve of incidence falls." Doctor D'Ewart disposes of the argument that the reason for the decrease in the case incidence is to be found in the fact that the number of susceptible children is growing less year by year, by showing that this decrease is comparatively small as the figures indicate "that at the beginning of school life 23 out of 25 are unprotected, and in the last year at school, 20 out of every 25 are still unprotected by a previous attack."

Finally Doctor D'Ewart sums up very tersely the present status of our lack of knowledge concerning this pernicious and serious disease as follows:

"Our knowledge of the disease is infinitesimal. We do not know the cause, the mode of infection, the point of entrance. We are ignorant of the incubation period. We do not know when the patient begins to be infectious, whether before the rash appears or only subsequent to that rash. We do not even know whether the rash is essential to the disease: probably not. No man knoweth when the case is free from infection, strive he never so mightily. Return cases are the despair of the conscientious sanatorium superintendent. But one thing amidst all the welter of ignorance remains certain: if the patient went to school it was undoubtedly the fact that the infection was derived from school, though no one ever stated how many of his cases in any one year could be traced to that cause, and latterly there have actually been suggestions that too much was blamed on that one source. Careful investigation *in the school* shows that this idea must be given up, just as the paludal origin of malaria or the sewer gas origin of typhoid fever have had to be given up.

"Later, when the series of cases is complete, evidence will be produced showing that the bulk of the cases occurring in school children can have nothing directly to do with school, and connecting the remainder chiefly with district infection, presumably due to overlooked cases or a contaminated milk supply, and secondarily with "return cases" from hospital."

A Child's Welfare Fund.

The Elizabeth McCormick Memorial Fund has opened an executive office in Chicago and has appointed Sherman C. Kingsley as Director. Mr. Kingsley was formerly Director of the Chicago Bureau of Charities. The object of the fund, as announced by a recent circular is "To improve the conditions of child life in the United States." The plan of work contemplates general propaganda and co-operative work with existing agencies. But more especially the fund will devote its energies to promoting in an experimental way, open air schools and to standardizing the methods of such schools. Three schools are now being maintained by the fund. Tent stations for sick babies and general infant welfare work will also be undertaken. The fund has for free distribution copies of an excellent hand-book on open air schools entitled "Open Air Crusaders." Other literature will also be published and educational work through the press, by exhibits and lectures will be undertaken. The address of the fund is 315 Plymouth Place, Chicago.

VOL. II. MAY 1912 No. 5

AMERICAN JOURNAL OF PUBLIC HEALTH

REGULATION OF MARRIAGE

Dr. J. N. Hurty
Indiana State Health Commissioner

Read April 4, Chicago Medical Society

One time a friend writing to me from Switzerland said — "I never saw so many idiots. Cretins, they call them. I saw a pair of them married in the cathedral and the priest blessed their offspring. I am told they are very prolific and that their output of children will be idiotic. The marriage of Cretins should certainly be prohibited by law." That the marriage of those carrying hereditary taint should not be permitted is the general opinion and the same is sustained by the science of eugenics, yet not a few there are who emphatically say *no*. Those whose negative arises from religious belief cannot, of course, be considered, for the question must be settled by cognate facts.

That certain persons should not be permitted parenthood appears in the well-known facts concerning the Jukes family, so skillfully worked out by Dr. Dugdale. Still more striking are the facts given by Conklin "a young man of good family, after his discharge from the Continental Army, who mated with a feeble-minded girl in New Jersey. Later, the young man married a Quakeress and founded a family which has since become distinguished in trade and in the learned professions.

From the feeble-minded daughter of the first marriage there were 480 descendants. (**A**)

From the eight normal children of the second marriage there were only 365 descendants. (**B**)

A	Status of Descendants	B
46	Normal	362
143	Feeble Minded	0
36	Illegitimate	0
33	Sexually Immoral	1
3	Syphilitics	0
3	Criminals	0
3	Epileptic	0
8	Kept House of Ill-Fame	0
1	Insane	1
24	Alcoholic	1
82	Died in Infancy	15

This history constitutes a striking proof of the tendency toward the inheritance of feeble-mindedness. But it has been argued that "the proportion of syphilitics, criminals, sexually immoral, epileptics and insane is scarcely greater, in some respects not so great, as might be found among 480 individuals chosen at random, the greater proportion of whom it might be assumed possessed the advantage of having been reared in a better family environment."

Plainly, this argument cannot be accepted, because what is abnormal should be compared with the normal, not with an average from normal and abnormal. Then, again, the statement in comparison with the average is not true. If it were, then the average of defectives in general life would be 45.5%.

But these considerations, though most important and interesting, are not needed for my purpose as the simple assumption of restricting the procreation of the unfit will be all sufficient.

Marriage Regulation.

We first recognize that the male human being is a natural polygamist. This may be true also of the female, but I let that pass. The point is, marriage is not required for procreation and it is an institution necessitated by social expediency. The law, therefore, rightly regulates it. It is unlawful for persons of a certain age to marry, even with the consent of parents. It is unlawful for brother and sister to marry, and in certain states cousins cannot lawfully marry. In other states the law forbids the marriage of whites and blacks. Further, the law empowers only certain persons to perform the ceremony and requires the procurement of a license from a certain official as a prerequisite. Obviously, society could, if considered necessary, impose further restrictions, or indeed any restrictions it wished to, the whole matter being controlled by expediency. The question is not — how far may society go? but — how far shall it go?

EUGENICS LAWS.

Indiana has two eugenics laws. The first, passed in 1905, legalizes sterilization, and has for its prime object the prevention of the procreation of the unfit. This law contemplates but does not impose solely, sterilization by vasectomy. By this method impregnation only is prevented, the power of coitus being unimpaired. It, therefore, does not interfere with marriage, nor does it relate thereto, but is referred to because some men who have been sterilized by vasectomy have married with full knowledge by their wives that they could not be fathers, and now have permanent and happy homes, though childless.

Indiana's other eugenics law was passed in 1905 also, and commands that: "No license shall be issued except upon written and verified application. Such application shall contain a statement of the full Christian and surname, color, occupation, birthplace, residence, and ages of the parties, whether the marriage contemplated is the first, second, or other marriage, together with the full Christian and surnames, residence, color, occupation and birthplace of their parents, including the maiden name of the mother, together with such other facts as may be necessary to determine whether any legal impediment to the proposed marriage exists.

"Applications for license to marry shall be uniform throughout the State, and it is hereby made the duty of the State Board of Health to furnish a form, therefore, to the several clerks at once upon the approval of this act: Provided, That the State Board of Health may revise said forms so furnished from time to time as may be advisable.

The law further commands:

"No license to marry shall be issued where either of the contracting parties is an imbecile, epileptic, of unsound mind or under guardianship as a person of unsound mind, nor to any male person who is or has been within five years an inmate of any county asylum or home for indigent persons, unless it satisfactorily appears that the cause of such condition has been removed and that such male applicant is able to support a family and likely to so continue, nor shall any license issue when either of the contracting persons is afflicted with a transmissable disease, or at the time of making application is under the influence of an intoxicating liquor or narcotic drug.

"In those cases when the right to a license is not made to appear the clerk shall refuse the issue of same. At once upon such refusal he shall certify the proceeding to the Circuit Court without formality of expense to the applicants, who shall be notified by him of such action. Such application shall thereupon be at the earliest practicable time heard by the circuit judge without a jury, in court or in chambers during the term or in vacation as the case may be, and in finding that a license ought to issue or ought not to issue shall be final and the clerk shall act in accordance therewith, the true intent of this action being to secure for the applicants a hearing by said judge without affirmative action by said applicants, and to give notice to them of such hearing, its time and place, without delay or expense.

"If persons resident of this State with intent to evade the provisions of Section 1 and Section 3 go into another state and there have their marriage solemnized with the intention of afterward returning and residing in this state, and do so return and reside in this state, such marriage shall be void, and such parties, upon returning to this state, shall be subjected to all the penalties provided in this act: Provided, This Section shall not apply to persons who in good faith become or are citizens of any other state.

"Whoever procures the issuance of a license to marry by any false statement, representation or pretense shall be fined in any sum not exceeding five hundred dollars.

"Whoever being duly authorized to solemnize marriage in this state knowingly joins in marriage persons who have not complied with the statute relative to the procurement of marriage license shall be fined in any sum not less than twenty-five dollars.

"Every clerk of the Circuit Court who shall issue any license contrary to the provisions of this act shall be fined in any sum not less than twenty-five dollars nor more than one hundred dollars."

As commanded, the State Board of Health prepared the appended blank forms of application for license to marry.

Application for Marriage License — Female.

Application is hereby made for a license for the marriageof ——— to ——— upon the following statement of fact relative to said parties: 1. The full Christian and surname of the woman is ———. 2. Color ———. 3. Where born?———. 4. When born ———. 5. Present residence ———. 6. Present occupation ———. 7. Full Christian and surname of father ———. 8. His color ———. 9. His birthplace ———. 10. His occupation ———. 11. His residence ———. 12. Full Christian and maiden name of mother ———. 13. Her color ———. 14. Her occupation ———. 15. Her birthplace ———. 16. Her residence ———. 17. Has the female contracting party been an inmate of any county asylum or home for indigent persons within the last five years?———. 21. If so, how and when?———. 22. Is the female contracting party afflicted with epilepsy, tuberculosis, venereal or any other contagious or transmissible disease?———. 23. Is she an imbecile, feeble-minded, idiotic or insane, or is she under guardianship as a person of unsound mind?———. Signature of applicant———.

Application for Marriage License — Male.

Application is hereby made for a license for the marriage of ——— to ———, upon the following statement of fact relative to said parties: 1. The full Christian and surname of the man is ———. 2. Color ———. 3. Where born?———. 4. When born?———. 5. Present residence ———. 6. Present occupation ———. 7. If no occupation, what means has the male contracting party of supporting a family?———. 8. Is the male contracting party of nearer blood kin to the female contracting party than second cousin? ———. 9. Full Christian and surname of father ———. 10. His color ———. 11. His birthplace ———. 12. His occupation ———. 13. His residence ———. 14. Full Christian and maiden name of mother ———. 15. Her color ———. 16. Her occupation ———. 17. Her birthplace ———. 18. Her residence ———. 19. Has the male contracting party been an inmate of any county asylum or home for indigent persons within the last five years?———. 20. If so, is he now able to support a family and likely to so continue? ———. 21. Is this his first marriage? ———. 22. If not, how often has he been married? ———. 23. Has such prior marriage, or marriages been dissolved ———. 24. If so, how? ———. 24. When? ———. 26. Is the male contracting party afflicted with epilepsy, tuberculosis, venereal, or any other contagious or transmissible disease? ———. 27. Is he an imbecile, feeble-minded, idiotic or insane, or is he under guardianship as a person of unsound mind? ———. Signature of applicant ———. *Affidavit follows here.*

At first there was manifest some opposition and in instances very harsh statements were made, but finally this all died out, and now not the slightest opposition appears. The highest court has upheld the law in the case of a very rich and prominent man who was luetic and knew it, who was refused a license to marry. He thereupon went to Kentucky and was married, and upon return to Indiana, in due time, the marriage was declared null and void. So, if people with certain hereditary disease get married in other states to avoid Indiana's statute, they must remain out of the state or suffer the penalty.

As the enforcement of the law depends upon the county clerks, all new ones are sent a special letter from the State Board of Health which gives the argument of the law and makes plain the benefits its rigid enforcement will bring to the state. Of course, this is to educate and to arouse the interest of new officials. We have not sufficient data for conclusions, but it is true licenses to marry are denied daily in the state to those who should not marry and, although marriage is not necessary for procreation, still it is certain the law has done something toward the end at which it is aimed.

But its great fault lies in its inadequate provisions for enforcement. To correct this defect the following bill was introduced into the last General Assembly in 1911. It passed the House of Representatives, but failed in the Senate.

Section 1. Be it enacted by the General Assembly of the State of Indiana, that it shall be unlawful for county clerks to issue a license to marry to any male who fails to present a medical certificate showing him to be free from blood taint of feeble-mindedness or insanity, free from open pulmonary tuberculosis, and free from all venereal diseases, said certificate to be sworn to by a licensed physician and to be filed with the usual application for license to marry.

Section 2. The certificate required in Section 1 shall read as follows, to wit:

I, ———, being a legally licensed physician, do certify that I have carefully and fully examined ———, having applied the recognized clinical and laboratory tests of scientific medicine and find him to be free from all symptoms and taint of venereal disease, free from open pulmonary tuberculosis, and free from blood taint of feeble-mindedness and insanity.

Section 3. If persons resident of this state, with intent to evade the provisions of this act, go into another state and there have their marriage solemnized with the intention of afterward returning to this state and residing here, and do so return and reside in this state, such marriage shall be null and void and such parties, upon returning to this state, shall be subject to all the penalties provided for in this act.

Section 4. Violation of any provisions of this act shall be punishment by a fine of one hundred dollars.

Section 5. All acts or parts of acts in conflict with this act are repealed.

A second law directly relating to marriage makes it unlawful for first cousins to marry, which law seems in harmony with our present knowledge of hereditary concerning the degenerative influences of consanguinity.

Received for publication April 10, 1912

THE BACTERIAL CONTAMINATION OF BREAD

KATHARINE HOWELL

From the Bacteriological Laboratory of the University of Chicago

The literature upon the bacteriology of bread is relatively meager. Thus far, work seems to have been done mainly upon the so-called "diseases" of bread and upon the question whether bacteria that are contained in the flour, yeast and milk or that are introduced by workmen survive the baking temperature.

The results of investigations upon the diseases of bread are very uniform. The [1] best known bacterial disease is one in which gossamer-like threads are formed when the bread is cut or broken. This characteristic is usually, though not always, present in sticky or slimy bread. Organisms given the name of B. mesentericus, B. mesentericus panis viscosi I and II, B. mesentericus fuscus, B. panis and B. liodermis have been isolated from the sticky and slimy bread. B. prodigiosus [2] causes "bleeding bread." B. mesentericus vulgatus [3] is found in sour bread.

Whether non-spore producing bacteria survive the baking temperature must still be regarded as unsettled. The bacteria found in bread are so similar to those in flour [4] that it would be logical to think that the same bacteria survive. Stiegeler,[5] however, believes that all bread diseases caused by micro-organisms, with the exception of ropy bread, are of exterior origin.

Roussel [6] and Marchand [7] inoculated unbaked dough with B. tuberculosis and recovered cultures in the baked bread which were pathogenic for animals. Atwater [8], B. Fenyvessy and L. Dienes [9] also believe from their experiments that bacteria may survive the baking temperature. On the other hand, Auché [10] also taking B. tuberculosis cultures found that in every case the baking temperature destroyed the pathogenicity of the cultures for laboratory animals. He also found B. coli, B. typhosus, several types of B. mesentericus, staphylococcus and streptococcus were non-resistant to the baking temperature. Leveran [11] believes that bread, when it comes from the oven, is probably sterile and Belli[12] goes a step further and says that not only is the bread sterile when it comes from the oven, but it remains so for 22 hours.

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[1] Latar — Handbuch der Technischen Mykologie, 1908, pp. 520-525.

[2] Stiegeler — Pure Products, 1907, p. 467.

[3] (See [1]).

[4] (See [1]).

[5] Stiegeler — Pure Products, 1907, pp. 464-469.

[6] Roussel — *Ann. d'hyg.*, 1907, 4s., 8, p. 443.

[7] Marchand — Experiment Station Record, United States Department of Agriculture, 1910, 22, p. 64.

[8] Atwater — United States Department of Agriculture, *Farmers' Bulletin*, 389, p. 34.

[9] B. Fenyvessy and L. Dienes — *Ztschr. f. Hyg.*, 1911, 69, p. 223.

[10] Auché — Compt. Rend. Soc. de Biol.,1909, 66, p. 800.

[11] Leveran — *Journal American Medical Association*, 1910, 54, p. 62.

There is little published evidence on the spreading of disease by bread. It has been the suspected vehicle in some typhoid cases. Kayser,[13] in his report on typhoid in Strassburg, noted that typhoid had spread especially in the neighborhood of two bakeries and that bakers were particularly likely to have typhoid. Several cases of typhoid[14] in the Government Hospital for the Insane at Washington, D. C., were traced to the fact that the attendant who cut the bread as his first duty in the morning, had been taking care of a typhoid patient in his home.

It seems as likely that disease would be transmitted from the contaminated outside of bread in some such manner as the above examples indicate, and from exposure to dust, flies, etc., as from any pathogenic bacteria which might survive the baking temperature in the interior of the loaf.

With the plan of determining the degree of bacterial contamination of the outside of bread, 100 loaves were collected from various districts in the north, south and west sides of Chicago. The loaves were about the same size, ranging from 345 g. to 375 g. They were oblong in shape. The exposed surface was, therefore, about the same in all the loaves. The shops from which the samples were chosen differed greatly in conditions of sanitation. There was every degree of cleanliness from the clean shop where the bread wrapped in oiled paper,, was kept in glass cases, to the dirty shop where the bread was kept upon a counter, far from clean, freely exposed to dust, flies and to handling by the customers.

Each loaf of bread was taken to the laboratory as wrapped when purchased, since this imitated the conditions under which the bread would ordinarily be used.

The entire loaf was then swabbed with wet sterile cotton and the cotton thoroughly rinsed in 10 c.c. of sterile water. From this suitable dilutions were made.

The media used in the experiments were gelatin, lactose-litmus-agar and lactose broth, all of which were made according to the rules given in "Standard Methods of Water Analysis."

One c.c. of the original suspension and 1 c.c. of each of its dilutions were plated upon gelatin and lactose-litmus-agar. The gelatin plates of the first 50 loaves were incubated at exactly 20° C. for 72 hours, those of the last 50 at room temperature (which was practically 20° C.) for 72 hours, and the lactose-litmus-agar plates at 37° C. for 24 hours before making the colony count. The count, as the table shows, was much lower when the bread was kept under clean conditions than when the conditions were dirty. All acid colonies were picked and special search made for B. coli and streptococci. These were chosen as types, since they are both common and give some indication as to the cleanliness of conditions. B. coli was isolated from 3 loaves. Two of these loaves were purchased in very dirty shops. The third loaf came from a fairly clean store. Streptococci were isolated from 30 samples. Six cultures of streptococci were tested by the usual fermentation methods in order to determine their classification. The results were as follows:

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[12] Belli — Centralbl. Hyg., 1907, 2, p. 359.

[13] Kayser — München Med. Wchnschr., 1909, 56, p. 1,066.

[14] Lumsden — Bulletin No. 78, Hygienic Laboratory, United States Public Health and Marine Hospital Service, p. 165.

STREPTOCOCCI

Saccharose		Raffinose	Salicin	Mannite	Lactose	Inulin	Classification
1	+	−	+	−	−	−	Strept. equinus
2	+	−	+	−	+	−	
3	+	−	+	−	+	−	
4	+	−	+	+	+	−	Strept. fæcalis
5	+	−	+	+	+	−	" "
6	+	−	+	+	+	−	" "

One c.c. of the original suspension from each loaf (representing one-tenth of surface) was inoculated into each of five fermentation tubes containing lactose broth. These were incubated at 37° C. for 24 hours. When gas production occurred during that time (17 cases), the tubes were plated out upon gelatin and lactose-litmus-agar and the plates examined for B. coli. This organism was found on three plates. In one tube fermentation was due to B. cloacæ, in the remaining 13 tubes to varieties of B. proteus. I am indebted to Professor E. O. Jordan in connection with this work.

TABLE I.

UNWRAPPED BREAD

No. of Loaves	Conditions under which bread was kept	Colony count per loaf						No. of Loaves giving		
		Lactose-Litmus-Agar			Gelatin					
		Average	Mini.	Maxi.	Average	Mini.	Maxi.	Gas-producing organism	B. coli	Streptococcus
31	Dirty	64,970	690	1,630,000	14,092	180	120,000	8	2	14
31	Fair	3,117	180	32,000	3,952	220	20,000	7	1	8
18	Clean	835	80	5,000	2,537	160	14,000	2	0	5

WRAPPED BREAD

No. of Loaves	Conditions under which bread was kept	Lactose-Litmus-Agar Average	Mini.	Maxi.	Gelatin Average	Mini.	Maxi.	Gas-producing organism	B. coli	Streptococcus
9	Fair	848	220	3,000	1,058	120	3,200	0	0	3
11	Clean	671	40	2,200	532	80	2,600	0	0	5

TABLE II.

Per cent of samples with	Unwrapped Bread	Wrapped Bread
More than 10,000 bacteria*	17	0
1,000-10,000 bacteria	45	15
Less than 1,000 bacteria	38	85

*Agar at 37° C.

Received for publication April 29, 1912.

THE CONSERVATION OF FOOD PRODUCTS BY REFRIGERATION

DR. P. H. BRYCE
Ottawa, Canada

Read before the American Public Health Association, Havana, Cuba, December, 1911.

I have, within the last several years, had occasion to investigate the subject taken for my paper and have been surprised at its many phases as affecting public health. Many years ago I learned from personal observation and experiment that milk could be long maintained sweet, even in hot weather if carefully handled in clean utensils during milking and immediately afterwards reduced by cooling to 40° F., and then placed in an ice storage chamber. Doctor C. E. North in his paper last year before this Association told of how at 350 miles from New York he was able, by co-operation and scientific methods to have milk similarly cooled at the farms or at a central station, and even in hot weather to deliver milk two days old in New York and maintain an average bacterial count of under 30,000 bacteria per c.c.

Those who are familiar with the methods of inspection, killing and cold storage in the great packing houses, are equally familiar with the fact that healthy meat is maintained in the most perfect condition by a temperature of 32° for two, three and even for four months. Fish if frozen for equally long periods is kept with very satisfactory results; while it is further possible with the latter, if chilled, as the motto is, "from the keel or schooner through the cold storage warehouse and refrigeration car till it reached the consumer" to deliver fish for several months after taking in better condition than those which we get often which are only twenty-four hours old.

Perhaps, however, the most remarkable evolution of the science has been shown in the cold storage of fruits, since this has made it possible to put California strawberries in London in a better condition than they are often received from the Mediterranean, and it further has enabled the South to supply them to all the Northern States in the winter and spring months in as good and better a state, even if higher in price, as the local fruit in the summer months.

To illustrate it may be stated that the Bureau of Plant Industry at Washington has experimentally shown that more than 90% of the difficulties in the storage and transportation of fruits are the result of not following the simple rules of ensuring sound fruit, carefully picked and packed, quickly cooled after harvesting and transporting it to the markets in properly constructed regriferator cars, cooled when necessary *en route*. Thus in a table given to show this the best packed fruit, as oranges, arrived at New York from California with only 0.5% defective and but 10% after three weeks kept in cold storage, while ordinary commercial handling with cold storage had a loss of 22% in three weeks. An even better result was obtained for the same period with properly packed California grapes. Illustrating the opposite condition, the Report of the Canadian Department of Agriculture for 1909 states that of some 900,000 barrels of apples exported to the British market in 1909 it would have been better for the shippers and for the credit of Canadian fruit "if one third of the apples exported had never been shipped." Similarly the Washington Report states that Florida lost $500,000 and California $1,500,000 worth in 1909 of marketed fruit due directly to decay; and when it is stated that of probably 15,000,000 barrels of apples grown in Canada in 1909 only so small an amount was exported, the economic losses to the growers and the high prices to the consumers will both be realized as of prime importance both from the economic and public health standpoints. It becomes, therefore, of interest to recall for a moment the physical laws which enter into this much neglected practice of refrigeration.

Upon heat depend all the vital energies of matter, whether animal or vegetable, and while it determines the germination, growth and maturing of these, yet it is plain that similar changes must equally go on in all organic tissues, when they are deprived of life, if the heat remains still present, and if the other conditions, as of moisture are favorable for the development, on them and in them, of other living organisms as bacteria or fungi. As it is the degree of heat which measures the amount of molecular motion in any substance it is apparent if we are to prevent or limit this action in substances to be kept for food that we must eliminate the heat present in them. As the normal temperature of animals is 100° F. and that of fruits on the hot earth is often as great, it is apparent that to remove this heat we must cause its radiation in cold chambers, evaporate it by currents of air and by convection through these movements of air of unequal temperature. To illustrate by a single example. When an animal has been slaughtered in the abattoir we proceed to remove its animal heat as rapidly as is found possible. The specific heat of meat is about 0.8 as compared with water and if we take a dressed carcass as being 700 lbs. this means that to reduce the temperature from say 100° to 30° F. in some 36 hours, one B. T. U. must be removed for every pound for each of the degrees between 90° F. and 30° F. by some cold producing agency as ice or an ice making machine. In effect the melting 140 lbs. of ice would be required with about one-third more daily to maintain it cool when refrigeration has taken place.

Probably about the same amount of cold is required to reduce the temperature of seven barrels of apples or an equal bulk of strawberries. A concrete case of what is actual practice will be better appreciated, when it is stated that a car load of oranges which represents in bulk about 150 barrels, requires the application of all the cold which can be produced by a 10 ton capacity ice machine to reduce the temperature of a well insulated car from 80° F. to 40° F. in some 20 hours, which is only at the rate of 2° per hour for the car. In well insulated structures it is further necessary to supply cold at the rate of about 2 B. T. U. for every square foot of wall surface per twenty-four hours to hold an even temperature; but it will readily be seen that with the best construction possible the shaking of a car and its rapid movement through a hot climate, as from California, makes the transportation of fruit a very difficult problem. Yet in practice it is found possible by two recoolings by cold air during transit to have fruit arrive in New York in the condition already illustrated.

But the production of cold is not alone the problem of refrigeration. As the bacteriologist will appreciate, the amount of moisture present or the relative humidity of the cold storage chamber is of almost equal importance with the temperature, since in a saturated air moulds are known to grow on meat at temperatures much below freezing point. Hence it is a point found in practice quite difficult to always maintain a relative humidity of about 75% when it is remembered that at low temperatures the small amount of moisture required to saturate does not permit a fall of temperature of more than two or three degrees to occur if saturation is to be avoided. Hence provision for the constant changing of the air around the stored articles is essential to successful results and so the problem of the ventilation of the chamber always enters into the question. Remembering further the great range in outside temperatures throughout a year, it will be apparent that the methods of constructing non-conducting walls and roofs of cold storage warehouses and compartments have come to be a science to which special engineers have devoted much time and intelligence. But when the amount of refrigeration has been determined for the capacity of any warehouse or amount of food, we still have left to consider the mechanical side of how to produce the cold. How little the general or even professional public have hitherto understood of what is required, may be appreciated when I say that I have learned of not more than two universities in any country which have arranged a course of study in the science of refrigerating engineering and I know of nothing wherein so many questions of physics are involved. Leaving out its application for the moment to most varied products, there is the primary question of whether to adopt the Co_2, So_2 or NH_3 machine and, if as is now common in America, the *Ammonia process* is selected, then the next point to be determined is whether it shall be the direct expansion and compression method of producing cold with anhydrous ammonia or whether it will prove more effective and economical to use the absorption system and a saturated aqueous ammonia solution, and then after this whether the flooding system would add effectiveness.

The importance of all this will be seen when it is seen that not only must there be a machine adequate for maintaining the requisite amount of cold, but this machine must also be operated at the highest point of efficiency, since the success and application of cold storage like other processes will in the end be determined not from the health standpoint but from the financial or commercial standpoint of profit or loss.

I have said enough to draw the attention of the Association to some of the problems involved in Refrigeration and in concluding have to say that I know of no single study we are engaged in, which demands more serious attention from the health point on the part of every health officer, whether federal, state or municipal, than this of the preservation by cold of the food of the people.

Discussion.

Doctor Snow:

In California we are interested in experiments on cold storage preservation of foods. Our Legislature last spring had this subject brought before it in an interesting way through bills relating to the importation of oysters from the Atlantic Coast. It was evident that there is no uniformity of opinion on the practical details of this problem. The bill, which was finally defeated, provided that oysters being shipped into California must be shipped in the original shell and must not be longer than four days in transit and storage before sale to the consumer. Doctor Bryce has spoken of apples especially, but probably all of us agree with him that this Association should appoint a committee on standardization of cold storage methods in general, this committee to consider not only the application of the principles of cold storage by companies engaged in this industry, but the proper selection of foods for cold storage and necessary precautions to be taken in marketing products after release from cold storage plants. The various committees of this Association appointed in the past to report on standard methods of scientific technique have done invaluable work, and a new committee assigned this problem would undoubtedly be of great service.

Doctor Dowling:

We have a great deal of refrigerated meat shipped from Omaha and Kansas City and I would like to ask how long meat will keep, after taken from cold storage, when exposed to the air?

Also your experience in the handling of refrigerated eggs? How long will eggs keep fresh when removed from cold storage to the average country store?

Doctor Rankin:

The most important point which Doctor Bryce's paper raises, and one that I think this Association should note, and possibly take some definite action on, is the importance of Medical Sociology in its relation to public health.

We all recognize the fact that health work is, to a large extent, dependent upon the practitioners of medicine, it is from them that we get our vital statistics, accurate or inaccurate, complete or incomplete, upon which intelligent public health work is based. For over two thousand years the relation of the physician to the public has been the relation of an attendant to a patient. This relation has been intimate and confidential, the public have been excluded and so the habit of thought has grown and become firmly fixed in the profession to regard the individual and not the group or community or public. The communicability of diseases gives the physician a relation to the public which the old habit of individual consideration to a large extent minimized. We must in some way bring the question of Medical Sociology more prominently before the mind of the rank and file of the profession.

I do not believe that this Association could take more important action than to appoint a committee to draft a resolution calling upon the American Association of Medical Colleges to stress the importance of the subject of Medical Sociology as a part of the curriculum of the medical schools of our country.

Doctor Roberts:

Having in mind the fact of the greatly increased cost of living in our cities and the failure of the wages of working people of the more poorly paid class to increase commensurately with this cost. we are considering the project of a municipal ice supply for the benefit of those who buy their food in small quantities paying thereby more for it and thus adding in the long run to its already high price.

We are somewhat at sea as to how to go about the establishment of this supply. I will, therefore, be very glad to hear from anyone having any practical experience with an undertaking of this kind in their own city.

Mr. F. W. Bell:

I am especially interested in Doctor Bryce's paper in view of the bill that has been proposed by the Federal Government of the United States. If I interpret Doctor Bryce's paper correctly he wishes to encourage refrigeration, while the action of the United States Government is rather contrary limiting the amount of refrigeration for such short periods of time that it is going to be commercially impossible to make all these things and to keep them so that people can get them at all times and seasons of the year. The egg supply of our country is practically all harvested, (if I may be allowed to use that expression) in the Spring of the year, and under this proposed law these eggs can not be kept until the following winter as they have been and are now being kept. Eggs are a necessary food supply and it is questionable whether the action of the Government is correct in this particular. It is a very important question for us to study out and find out that they are suitable for food purposes after long periods in the refrigerators.

Doctor Bryce:

In reference to the various questions which have come up in this discussion, I may reply by taking up first the question of its scientific and economic aspects from a health standpoint. The large mechanical problems in refrigeration and engineering questions would form ample subject for discussion, but I do not propose to discuss them now. I may simply say this, that of all questions which I have ever attempted to discuss whether in its bearing on sociological or economic science, I have never touched any one that seems to be more unlimited than this. Doctor Snow comes from a country where oysters brought from the east coast are being sent and expected to keep until at any rate the shells are opened. It is a well ascertained fact that all frozen products such as mutton from Australia arrive in London in a perfect condition, and the question is whether it is going to be good when it reaches the hands of the consumers. For instance, the mutton arrives in London in a frozen state, is taken to a cold storage warehouse, but it has got to come through two or three stages of gradually rising temperature in order that the tissues of the meat be not torn. So it means one, two or three days of the mutton after coming from Australia to be thawed out and be put in the hands of the consumer. It is then in much the same condition as local meat.

It would depend upon whether the oysters had been frozen as to whether the oysters could be exposed in the front of a meat shop and as to whether they would be good for hours or for days. If taken from the shell immediately on being taken from the water and placed in a temperature of 32°F., it could be possible to keep them in a wholesome condition for some days. Doctor Dowling's question is answered in the same manner.

Meat when it comes from Chicago has to be chilled and kept at thirty-two degrees, slightly stiff, although the meat is not frozen hard. Taken from cold storage in Chicago and sent to New York, meat is perfectly good at the end of a week or more, being taken out from storage from day to day that for to-morrow, taken out today. I would insist upon this matter, that in all shops there must be a large cooling room with proper humidity if we are going to have our products keep perfectly from day to day.

From the point of sanitation and sociology, I need hardly say that it depends upon the class of the food products that we are to estimate their value as world foods and the class of people produced.

The very essence of the problem is found in the question that was raised here as to whether the action taken by some legislatures recently in regard to the time foods should be in cold storage is necessary and wise or not. We all know that the Trust may have greatly extended the long continuance of food under storage conditions. But as to other results we may take the apples of Canada as an illustration. The apples are picked and packed there and in October shipped to Liverpool which port is absolutely glutted with barrels of apples from October to November. They reach the market in Liverpool often in such a state that they do not pay the exporter anything; they only pay the commission man and the transportation companies, nor does the farmer who grew them make much. The absence of cold storage caused their making nothing and there was the loss of proper profit on the nine hundred thousand barrels that were exported. These are questions that argue for cold storage. With cold storage not only would the apple market in Canada have had its ample supply of apples at reasonable prices in February and March, but they could be exported till April. So when people accuse the cold storage man of making prices high, they are quite wrong to blame him alone. It is the non-use of cold storage that makes prices high, as apples will decay soon they are not cold storaged and the quantity is lessened. If you place at once in cold storage your supply of apples, then from October to March the people would meet with even prices. It is the same with oranges, only you cannot load the market with oranges kept over long periods, as you can with some other fruits. They have their limitations much more than such fruits as apples.

When Chinese eggs were seized last spring in Montreal, my friend, an expert, told me he was asked to examine them. It appears the process is to break them up and sterilize and freeze them. They may be indeed fresher and in far better condition that those eggs that had come from local farms. When you get eggs from the farm there may be one or two out of every dozen bad and may have been collected a week or more. If the producer can guarantee the eggs fresh today, still it means a weekly collection of eggs in the country. If they are perfect at the start they then have to hold them at a temperature of thirty-two degrees. You have to start the very first day to apply refrigeration and have its average temperature of 80° brought to 32° gradually. When speaking of the engineering problem of refrigeration before the Royal Society of Canada last May, I pointed out to the professors in physics at two of our universities that they were not giving the people the benefit of their knowledge.

The situation demands that the scientific and mechanical knowledge required to construct and handle small or large refrigeration plants must be made common: that the people, producers, and consumers be taught its needs and its applications and that a class of students trained to manage large plants be turned out of our universities.

A METHOD FOR THE BACTERIOLOGICAL STANDARDIZATION OF DISINFECTANTS

TATSUZO OHNO AND H. C. HAMILTON
Detroit, Mich.

The great number of methods, which have from time to time been brought forward as means of comparing the values of disinfectants, have been remarkable for the similarity in their essential points and the variety in their minor details.

These methods may be divided into two classes:

1st. Those in which dried masses of bacteria, or moist solid matter containing bacteria, are immersed in a disinfectant.

2nd. Those in which the bacteria are suspended in a solution of the disinfectant and are individually exposed, *i.e.* the culture is filtered, or in some convenient way the clumps of bacteria are excluded from the test.

The first of these is of value to determine the penetrating power of a disinfectant and only indirectly, its germicidal value. The method known as the Garnet Method of Kronig & Paul (Zeitschrift für Hygiene 1897, 25, p. 1) and that proposed by Kendall & Edwards (Jour. Inf. Diseases, Vol. 8, 1911 page 250) are representatives of this class. The Thread Method (Jour. Royal Sanitary Institute, Feb. 1906, p. 18) is of this character too, but a better opportunity is given in this method for the disinfectant to come into contact with the organisms, because of the action of a liquid in loosening up the fibre of the threads.

Modifications of this general method will not be discussed in this paper.

The second class embraces practically all the other methods proposed, as these, although differing greatly in details, all make use of the general plan to expose the individual bacterium to dilutions of the disinfectant comparing the maximum dilutions of disinfectant and of carbolic acid, which kill the organism in the same time limit. Of the various methods proposed for the valuation of disinfectants that of Rideal and Walker (Jour. Roy. San. Inst., 1903, 24, p. 424) has received most general recognition.

While it is true that no method has been more severely criticized than this, the fact remains that the objections are to the details and not to the principle of the method.

One of the most serious objections in the minds of some is the absence of more than minimal amounts of organic matter. Suggested modifications of the method have been made in which starch, urine, milk, blood and faeces were added to the disinfectant in an attempt to imitate natural conditions during practical disinfection. (Blyth, Jour. Soc. Chem. Ind. 1906). While it is true that organic matter is always present when practical disinfection is to be carried out, the values of disinfectants of one class, as for example emulsified products derived from coal tar, are all affected by the introduction of organic matter. Their comparative values can therefore be determined almost as accurately without as with this addition.

The time at which disinfection must be accomplished has been fixed by some and only the dilution strength varied (Sternberg). In another method (Chick, Journal of Hygiene 1908) the velocity of disinfection has been determined, all the factors, time, temperature, dilution of disinfectant, etc., being considered in obtaining the constant. In this method complete disinfection is not necessary, the decrease in number of surviving bacteria being sufficient data on which to base the value of the disinfectant.

The organism recommended by Rideal & Walker for use in standardizing disinfectants, namely *B. typhosus*, has been objected to because of the danger to the operator and also because a contaminated subculture cannot be detected except by a microscopical examination.

The London Lancet appointed a Commission to make an independent investigation of the problem of standardizing disinfectants. The bacteriological part of this inquiry was intrusted chiefly to Dr. G. Sims Woodhead, the results of their investigation being published in the Lancet Nov. 13, 20 and 27, 1909, covering both the chemical and bacteriological sides of the question.

This Commission decided that the Rideal-Walker Method will give accurate results if proper attention is given to all the details and the tests carried out by one who is in constant practice in such work. However because of their many failures with the method they suggested a number of modifications chief of which were the test organism, the medium, the amount taken for subculture and finally the method of determining the coefficient.

B. coli communis was chosen as the test organism, the subcultures being grown on McConkey's bile salts medium. This was done chiefly because the organism is non-pathogenic and will give a characteristic growth on McConkey's medium of which 10 c.c. is used.

The amount used for planting subcultures is about three times the usual loopful, being taken with a platinum spoon holding 0.08 c.c. The same measure is used for seeding the disinfectant tubes. The latter are of special construction being 2½ inches high by ⅞ inch in diameter and are to be kept, during a test, in a water bath of constant temperature, namely 20° C.

"The coefficient was deduced as follows. The figure representing the percentage strength of the weakest dilution of the carbolic acid control was divided by the figure representing the percentage strength of the weakest lethal dilution of the disinfectant being tested. This was done at the $2\frac{1}{2}$ minutes line and at 30 minutes line and a mean of the resulting figures was taken as the carbolic acid coefficient."

One other method, namely, that of the Hygienic Laboratory proposed by Anderson and McClintic (Jour. of Inf. Diseases Jan. 1911) will be noted here. The modifications suggested are chiefly the return to the organism employed by Rideal and Walker namely, a culture of *B. typhosus* of which 0.1 c.c. is used, the culture medium adopted by the American Public Health Association for water analysis of which 10 c.c. is to be accurately measured into test tubes, a 4 mm platinum loop for making subcultures as originally suggested by Rideal and Walker, and an elaborate form for making dilutions of the disinfectant. Their conclusions are drawn in the way suggested by the Lancet Commission.

One statement made by these authors is significant. "Lack of attention to the different factors concerned in the examination of disinfectants is responsible for a large percentage of the inconsistencies or discrepancies in results obtained by the same or different workers when working with the same disinfectant. Unless strict attention is paid to the various influences involved it is useless to expect to find any method satisfactory."

This statement coupled with that of the Lancet Commission that "To obtain accurate results great care and attention to detail and constant practice are necessary" seems to indicate that not so much importance attaches to the method as to the carefullness with which it is followed and constant practice with it.

Without going further into the various modifications it is the object of this paper to describe a method, which for 12 years has been in use in the Laboratory of Parke, Davis & Company as a means of standardizing disinfectants and especially those derived from coal tar. It, therefore, antedates all the recently exploited methods, although it has never before been published in detail. It was referred to only in the most casual way in a paper "A Contribution to our Knowledge of Insecticides," McClintock, Houghton and Hamilton) read before the International Congress of Zoölogists at Boston, Mass., in August, 1907. The paper was in part a comparison of the toxic, germicidal and insecticidal properties of a number of substances well known for one or more of these properties. It contained a description of the methods used in testing the value of these substances, the following being the short description of the method for determining their germicidal values, or the carbolic acid coefficients.

"A 24 hour growth of the *B. pyocyaneous* in bouillon culture medium, is filtered to break up or exclude clumps of bacteria difficult of penetration. Six drops of this culture containing millions of bacteria are mixed with 5 c.c. of a dilution of the germicide. After one minute's contact with this a subculture is made by removing a loopful of the solution, which, if properly mixed, will contain a proportional number of the bacteria originally introduced. This loopful is planted in a tube containing 5 or 6 c.c. of sterile bouillon which is then placed in the incubator for 24 to 72 hours, during which time any organism not destroyed will have multiplied sufficiently to be readily recognized. Subcultures are made in a similar manner after 2, 3, 4 and 5 minutes contact between bacteria and germicide, and changes are made in the dilution of the latter until such a dilution is obtained as will allow growth after two or three minutes' contact, but less than five minutes. The degree of dilution which will give this result for each preparation can be used in comparison with that dilution of carbolic acid which is equally efficient to obtain what is known as the carbolic acid coefficient—a very satisfactory method of readily showing the relative values of different germicides under the same conditions. But the widely differing conditions under which germicides must be used, makes any table of comparisons of only limited value." (Copies supplied on request.)

The method of testing disinfectants herein described in detail was never given any name since its authorship belongs to no individual. It is an adaptation of a method originally used at the University of Michigan, but it has been amplified and changed in its minor details until very little of the original remains, except the general fact of exposing the individual bacterium to the action of the diluted disinfectant and, therefore, belongs in Class II as classified in this paper.

Only one change of importance has been made since this was published, namely to substitute *B. typhosus* for *B. pyocyaneous* as the test organism. This change was made mainly to have the carbolic acid coefficient more nearly in accord with that of other methods, since *B. typhosus* is more generally used than any other organism, while *B. pyocyaneous* was used in no other published method.

The details of this method as now employed will be considered under the following heads:

I. The culture of the test organism.
II. The culture medium.
III. Dilutions of sample and of standard.
IV. Proportion of culture to disinfectant.
V. Time of contact between organisms and disinfectant.
VI. Conclusions.

I. The organism used is a vigorous culture of B. typhosus grown for 24 hours in standard bouillon culture medium at 38° C. It is taken from the incubator at least one-half hour before using, to allow gradual adjustment to changed conditions of temperature before exposure to the germicide. The culture and germicidal agent should always be at the same temperature before interaction takes place. The culture is filtered before use.

To determine accurately the germicidal strength of a germicide upon bacteria, filtration is absolutely necessary, as some bacteria may form scum on the surface of the bouillon or some may clump together in the medium during multiplication. If a mass of bacteria is exposed to a germicide, the superficial layer will be exposed instantly, but those germs in the inner portion of the mass will be protected by the outer layers and the action of the germicide upon them will either be completely prevented or retarded. Especially may this be the case when a germicide which coagulates albumen is used. No matter how great the germicidal power of a germicide, it cannot be expected to kill bacteria unless it is brought into direct contact with each individual cell, as a single cell of the mass, if not exposed and killed when all the other cells are destroyed will multiply into thousands under favorable conditions: consequently the following procedure is carried out before testing:—The 24-hour bouillon culture is removed from the incubator and kept at room temperature without agitation for about half an hour. Then, without shaking the culture, as is usually done, it is decanted into a specially constructed cotton filter, thus leaving scum and large clumps on the filter and filtering the individual bacteria in a practically isolated state. It is then filtered into a sterile test tube, which is subsequently shaken in order to obtain a homogeneous filtrate and make it ready for use.

The cotton filter for the filtration of bacterial cells is an ordinary test tube drawn out at one end like a centrifugal tube, the small end cut open and the edges smoothed with a flame. Into the large end a small pledget of good quality ordinary cotton is introduced as far as the constricted portion of the tube, pushed gently with the forceps, taking care not to form any fissure in the cotton or to leave any spaces between the cotton and tube. The open end of the tube is then plugged with cotton and the whole wrapped in cotton and parchment paper and sterilized by dry heat as usual. Before using the cotton filter after sterilization, the cotton in the tube should be gently pushed back to the proper place by means of a sterile pipette, so that it is in exactly the same position as before sterilization. During sterilization the cotton is pushed up by the tension caused by the heat and its own elasticity, producing an undesirable space between the cotton and the constricted part of the tube.

II. Culture Medium.

500	gm.	chopped beef.
20	"	Peptone (Witte)
5	"	Sodium Chloride
1000	c.c.	Water.

The beef is digested at 50° C 1–2 hour, then boiled, strained, the other ingredients added, then boiled again, filtered and adjusted to +1 reaction.

The efficiency of a disinfectant depends on the number resistance and the strain of the test organism. This in turn depends on the character and uniformity of the nutrient medium. Without going into particulars regarding the effect of changes in these various factors it may be said that uniformity in the nature of the bouillon, the degree of alkalinity and amount of peptone and sodium chloride is absolutely necessary in the growing of the test organism in order to obtain uniform results.

III. The dilutions of sample and standard are made either by weight or volume, depending on the character of the disinfectant to be tested. In the case of liquids such as the coal tar disinfectants, both sample and standard should be diluted by volume.

The Sample. Dilutions of an emulsive coal tar product should be made by adding water gradually to the measured quantity of disinfectant. The reason for this is that in some cases the character of the emulsion is greatly altered by the method of making the dilution.

An emulsion is less likely to break if it is made as follows:—To make a 1 per cent. solution moisten the measuring flask or cylinder with about 2 c.c. water. With a capacity 1 c.c. pipette measure the disinfectant and mix it with the water, using this mixture for a partial cleaning of the pipette. Then add more water, stirring just enough to mix but not to make the mixture foam. Wash out the pipette by drawing up and expelling the dilution, then make up to the mark.

This method requires more care in measuring the final dilution if the meniscus is obscured by the emulsion. If the last addition of water is made by carefully running it down the side of the container, the surface liquid will not greatly obscure the reading.

This 1 per cent. solution is further diluted to the desired extent by mixing with distilled water in proper proportion, in each case adding the measured disinfectant to the measured quantity of water to make the desired dilution.

The Standard. Merck's Pure Phenol, is diluted by volume by weighing out any desired quantity, dividing by the specific gravity, 1.08, and dissolving in distilled water, diluting to 20 times the volume of the carbolic acid used, to make a 5 per cent. solution by volume in volume. Further dilutions can be made from this as desired, since the solution is practically permanent.

The dilutions of Carbolic Acid ordinarily used with the results to be expected are as follows:—

	Minutes				
Dilutions.	1	2	3	4	5
1–110	+	–	–	–	–
1–120	+	+	+	–	–
1–130	+	+	+	+	–

The sample is usually diluted in such a way that not more than a half unit in the coefficient lies between two dilutions. For example

1–480 1–540 1–600 1–660 1–720

the intention being to compare with the carbolic acid dilution 1–120. A disinfectant value based on growth at one minute only would be far from exact. Much more accurate results can be obtained where the dilutions compared are those which kill the organism in from 3 to 5 minutes.

IV. The proper mixture of culture and disinfectant is carried out as follows:—5 drops of bacterial filtrate are introduced into 5 c.c. of germicidal solution, contained in test tubes 5½ inches long by ⅝ inch in diameter. This is added drop by drop in rapid succession, by means of a sterile pipette, 8½ inches long and 0.219 inches in diameter, the narrow end measuring about 0.075 inches in diameter, held vertically at the mouth of the test tube containing the germicidal solution, so that the pipette with the germs will not come into direct contact with any part of the test tube containing the germicidal solution. If any of the organisms adhere to the sides or to threads of cotton in the mouth of the tube they might be inoculated into the bouillon without being exposed to the germicide. As soon as the last one of the five drops is added to the germicidal solution, they are mixed thoroughly for 15 seconds or longer by holding the test tube in the left hand and shaking it with the fingers of the right hand, a formation of air bubbles shaped like a long funnel extending from the bottom of the tube toward the surface of the liquid shows that the mixing is efficiently done, thus bringing every bacterial cell into direct contact with the germicidal solution.

V. The subcultures are taken each minute for 5 minutes by means of a 23 platinum wire loop of 4 mm. inside diameter.

Tests of two dilutions can be carried on at the same time by one person as a half-minute is more than is ordinarily necessary for taking out a subculture and planting into the tube of culture medium. Tests of five dilutions of a sample and three of the standard can therefore be made in about 25 minutes.

To obtain a loopful of the mixture, the test tube should be tilted so as to prevent getting the foam formed on the surface of the mixture during shaking instead of getting a liquid portion of the mixture. The wire loop should be plunged almost to the bottom of the tube before withdrawing.

These loopsful are inoculated into test tubes containing about 6 c.c. of the standard culture medium above described. They are placed in the incubator at 38°C. for 48 hours or for such a time as it is found that no further development of bacteria takes place.

VI. Conclusion as to the value of a disinfectant from a test conducted as described, are drawn by comparing the dilutions of the sample and the standard, which are equally efficient. While in general one dilution of each is used for comparison, it is often necessary to take the mean of a number, since it is not uncommon for two dilutions to give practically identical results. Note, for example, such results as these:—

Carbolic Acid	1–120	+	+	−	−	−
	1–130	+	+	+	−	−
Sample	1–720	+	+	−	−	−
	1–780	+	+	−	−	−
	1–840	+	+	+	+	−

In this case if no other dilutions of the sample are tested the value is determined by comparing both 720 and 780 with carbolic acid diluted 120 and the result is 6.25 the average of the two values.

It will be noted that in the foregoing description no mention is made of the temperature at which the test is made. While temperature affects very vitally the process of disinfection, the changes in temperature of an ordinary working room rarely exceeds 10°C, while the average change would not exceed 5°C, the year around; and since the standard is affected to practically the same degree by these changes it seems an unnecessary complication to carry out the test at a rigidly defined temperature.

It will also be noted that the time of contact between organism and disinfectant is only one-third as long as is recommended in most tests. While it may form, in some cases a better picture of the value of a disinfectant to find its efficiencies at two periods such as $2\frac{1}{2}$ minutes and 15 minutes, practically no material change in its value results from such a course. The taking of a subculture each minute rather than at $2\frac{1}{2}$ minute intervals makes for greater accuracy, but this does not materially affect the results.

No two investigators are likely to find exactly the same value for a disinfectant even by the same method, if there are many points which may be interpreted differently, It is, therefore, very essential that there be a simple, standard method worked out in all its details, which shall be followed rigidly. The comments made above on some of these minor details is merely to point out how small some of them really are, as bearing on the general problem, while commented upon by their proposer as being of vital importance.

It is to be hoped that the Committee of the American Public Health Association on Standard Methods for the Examination of Disinfectants will in the near future publish a practical method, which will be adopted as official for the United States.

From the Research Laboratory of Parke, Davis & Co., Detroit, Michigan.

Received for publication, April 19, 1912.

TYPHOID FEVER IN NEW YORK CITY TOGETHER WITH A DISCUSSION OF THE METHODS FOUND SERVICEABLE IN STUDYING ITS OCCURRENCE.

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SCOPE OF THE PRESENT STUDY.

The following résumé is designed to show the methods found especially useful in studying the occurrence of typhoid fever. It is based largely on the writer's experience in the Department of Health in investigating and tracing, during the past seven years, the cause of typhoid fever outbreaks in New York City.

It may at once be stated that in a large city like New York, it is practically impossible to trace the source of infection in a large number of unconnected cases. As soon, however, as a series of connected cases occurs the possibility of discovering such source becomes usually only a matter of methods and proper facilities. The first point of importance, therefore, is the recognition of such connected cases. How is this to be accomplished?

NOTIFICATION.

The foundation of all such epidemiological studies is the prompt notification of all cases by the attending physicians to the public health authorities. While such notification of typhoid fever is required by law almost everywhere, it is notorious that in many instances only a small proportion of the cases actually occurring are reported to the authorities. This is especially apt to be the case where a more or less rigid quarantine is established and where the premises are placarded. It has always appeared to the writer that such rigid quarantines are not only unnecessary but that because of the reason just mentioned, they do more harm than good. The same is usually true of placarding, though at times this prodecure is necessary. If the family in whose house typhoid fever occurs could feel that notification would work no unnecessary or unreasonable hardships, we should soon find less opposition to the prompt notification of the disease to the health authorities.

It is possible, moreover, to encourage prompt notification, especially of typhoid fever, by providing facilities for the examination, without cost, of blood for the Gruber-Widal reaction, and of urine for Ehrlich's diazo reaction. A condition always made in reporting on such examinations is that the specimen bear the name and address of the patient. The efficiency of free blood examinations in securing notification of typhoid fever is well illustrated by the following figures which show the number of cases of typhoid fever reported in the various boroughs in New York City in 1907.

	Manhattan.	Bronx.	Brooklyn.	Queens.	Richmond.	Total in City.
Total cases reported	2,094	349	1,232,	160	145	3,980
Not typhoid	150	17	37	10	2	306
Blood examined	1,576	262	815	87	117	2,857
Widal positive	1,381	199	656	71	98	2,405

From this we see that about two-thirds of the cases reported to the public health authorities were reported indirectly by means of the blood tests. So far as New York City is concerned, this does not mean that only one-third cases of the of typhoid fever are directly notified; on the contrary, a great many of the cases are reported by physicians both directly (by mail or telephone) and indirectly (by specimens of blood sent to the laboratory). At the same time, many physicians who would hesitate to report cases of typhoid fever directly, or would forget to do so, gladly avail themselves of the aid to diagnosis afforded by blood examinations performed gratis by the health authorities.

DISTRIBUTION OF CASES.

Having then assured ourselves that the cases are fairly completely reported, the next point of importance is their geographical distribution. This can be ascertained by either of two methods. The simpler of these consists in the use of large scale maps of the city, mounted on board; each case being shown by a tack inserted in the location indicated by the address. This was formerly the only method pursued in New York City. It has the disadvantage that it does not lend itself readily to a differentiation of the cases occurring in any given district *according to time.* Thus twelve cases occurring in a given district within a week or two might be of the greatest significance, while the same number occurring within six or eight months might have little or no significance. On a map, however, except as memory helps, or unless many different colors are employed, no track is kept of this time element. For this reason, the writer some time ago introduced the following adjunct to the map record, based, in New York City, on the reported cases arranged by wards. With per-

Cases of Infectious and Contagious Diseases Reported and Deaths from the Same, by Wards.

Boroughs.	Wards.	Sickness.						Deaths Reported.								
		Typhoid Fever.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria and Croup.	Tuberculosis Pulmonalis.	Typhoid Fever.	Small-pox.	Measles.	Scarlet Fever.	Diphtheria and Croup.	Tuberculosis Pulmonalis.	Pneumonia.	Broncho Pneumonia.	All Causes.
Mahhattan.	First	..	..	1	..	..	3	..	..	..	..	..	..	1	1	2
	Second	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
	Third	..	..	..	..	..	2	..	..	..	..	..	..	..	..	2
	Fourth	..	..	..	..	..	2	..	..	..	..	..	2	3	2	17
	Fifth	..	..	1	..	..	2	..	..	..	..	..	2	..	..	5
	Sixth	..	..	..	..	..	2	..	..	..	..	..	1	1	1	11
	Seventh	1	..	15	8	11	13	..	..	1	..	..	1	..	..	7
	Eighth	..	..	1	..	3	3	..	..	..	..	1	2	..	2	15
	Ninth	2	..	4	2	6	12	..	..	..	..	1	1	2	2	26
	Tenth	..	..	5	9	..	8	..	..	..	..	1	1	1	2	13
	Eleventh	..	..	5	7	6	22	..	..	..	1	..	5	..	3	23
	Twelfth	2	..	80	79	103	102	1	..	1	..	9	26	17	16	236
	Thirteenth	..	..	9	9	14	3	..	..	..	1	1	3	..	..	10
	Fourteenth	..	..	..	..	1	3	..	..	..	..	..	1	1	1	10
	Fifteenth	..	..	5	1	2	2	1	..	..	..	..	1	..	..	5
	Sixteenth	..	..	..	3	2	7	..	..	..	..	..	3	..	1	20
	Seventeenth	5	..	18	10	17	49	..	..	1	..	2	4	5	6	43
	Eighteenth	1	..	9	1	7	13	..	..	..	..	2	3	3	3	36
	Nineteenth	2	..	34	28	15	50	..	..	1	1	3	17	7	5	122
	Twentieth	..	..	..	4	8	17	..	..	..	..	..	2	4	2	31
	Twenty-first	1	..	8	4	3	17	..	..	..	..	..	3	6	1	32
	Twenty-second	3	..	4	17	13	38	..	..	..	1	2	6	4	8	80
The Bronx.	Twenty-third	..	..	13	36	17	28	..	..	1	..	1	29	4	3	84
	Twenty-fourth	1	..	6	27	13	17	..	..	..	..	..	12	6	3	56
	Total	18	..	218	245	241	416	2	..	5	4	23	125	65	62	886
Brooklyn.	First	..	..	5	1	..	2	..	..	..	..	..	3	3	..	12
	Second	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
	Third	..	..	..	2	2	2	..	..	..	..	..	1	..	..	4
	Fourth	..	..	1	..	..	2	..	..	..	..	..	4	..	..	7
	Fifth	..	..	..	13	1	5	..	..	1	..	..	1	1	..	7
	Sixth	..	..	3	2	2	4	..	..	..	..	1	1	1	..	10
	Seventh	..	..	6	2	4	2	1	..	1	..	..	1	1	2	18
	Eighth	2	..	8	10	10	8	1	..	..	2	1	9	2	1	34
	Ninth	..	..	3	4	5	6	..	..	..	..	..	..	..	..	11
	Tenth	..	..	..	3	4	5	..	..	..	1	1	3	1	1	19
	Eleventh	..	..	1	..	2	1	..	..	..	..	1	4	1	..	12
	Twelfth	..	..	7	2	..	6	..	..	..	..	..	..	2	2	10
	Thirteenth	1	..	5	5	4	3	..	..	..	..	..	..	..	..	4
	Fourteenth	..	..	1	2	1	2	..	..	..	1	..	2	1	..	10
	Fifteenth	..	..	..	2	1	7	..	..	..	..	..	2	1	1	10
	Sixteenth	..	..	..	25	9	7	..	..	..	1	1	2	1	1	17
	Seventeenth	..	..	..	8	7	7	..	..	..	..	..	2	2	3	25
	Eighteenth	1	..	4	14	4	6	1	..	..	1	..	2	1	1	15
	Nineteenth	1	..	6	7	4	1	..	..	..	..	..	..	..	1	11
	Twentieth	..	..	1	..	2	8	..	..	..	..	1	..	1	1	8
	Twenty-first	..	..	2	6	8	2	..	..	..	..	..	1	1	3	22
	Twenty-second	1	..	8	11	3	5	..	..	..	..	..	1	4	2	30
	Twenty-third	..	..	3	7	5	1	..	..	..	..	1	2	1	..	26
	Twenty-fourth	..	..	4	12	6	6	..	..	..	..	..	1	..	3	9
	Twenty-fifth	..	..	5	6	4	5	..	..	..	1	1	2	3	2	20
	Twenty-sixth	..	..	11	49	36	39	..	..	..	..	1	3	4	3	32
	Twenty-seventh	..	..	2	5	8	9	..	..	..	..	..	2	2	..	11
	Twenty-eighth	..	..	..	3	7	1	..	..	..	1	..	3	..	..	27
	Twenty-ninth	..	..	11	2	6	7	..	..	..	1	..	2	2	2	25
	Thirtieth	..	..	42	7	..	4	..	..	..	..	..	1	1	1	16
	Thirty-first	..	..	8	3	2	..	..	..	..	..	..	1	..	..	3
	Thirty-second	..	..	1	1	1	..	..	..	..	..	..	..	1	1	6
	Total	6	..	148	215	148	163	3	..	2	9	9	56	38	31	471
Queens.	First	1	..	..	4	1	3	..	..	..	..	..	..	2	3	21
	Second	1	..	1	11	6	5	..	..	..	..	..	5	3	1	32
	Third	..	..	..	2	..	..	..	..	..	..	..	1	..	..	7
	Fourth	..	..	31	10	3	4	..	..	..	..	..	..	1	1	13
	Fifth	..	..	..	2	..	1	..	..	..	..	..	..	1	..	4
	Total	2	..	32	29	10	13	..	..	..	..	..	6	7	5	77
Richmond.	First	..	..	7	5	3	2	..	..	..	..	..	1	..	2	7
	Second	..	..	2	..	4	..	..	..	..	..	..	..	1	..	4
	Third	..	..	..	..	..	1	..	..	..	..	..	1	2	..	8
	Fourth	..	..	1	..	..	3	..	..	..	..	..	1	..	..	5
	Fifth	..	..	..	..	..	1	..	..	..	..	..	..	1	1	3
	Total	..	..	10	5	7	7	..	..	..	..	..	3	4	3	27

haps some rearrangement of the records, the system is applicable to any other large city.

In the weekly bulletin published by the Department of Health of the City of New York, all cases of infectious diseases reported are arranged by wards. The arrangement of this report is shown in the accompanying reproduction on the preceding page.

By tabulating the returns separately for each ward for a number of years, it is possible to arrive at an average for that ward week by week throughout the year. In the construction of such a table, it is important that any unusual epidemic occurrence of the disease be left out of the calculation; the object of such a table being to establish what, under the present conditions and in the present state of sanitary science, may be regarded as "normal" for that ward without exciting undue suspicion. The writer speaks of such a table as a "normalized average" or "average normal incidence."

The following figures show the construction of the tables here described:

22nd Ward

Week	1906	1907	1908	1909	1910	Normalized Average	Week	1906	1907	1908	1909	1910	Normalized Average
1 January	0	3	0	4	3	2	27 July	3	3	0	2	5	3
2 "	1	3	4	3	1	3	28 "	2	1	2	0	2	2
3 "	1	3	0	2	2	2	29 "	3	4	3	8	6	5
4 "	4	4	1	2	4	3	30 "	11	6	3	15	15	7
5 February	0	3	1	3	2	2	31 "	8	4	3	0	14	4
6 "	1	6	[illegible]	2	2	2	32 August	13	6	5	3	5	7
7 "	5	3	0	2	4	3	33 "	6	8	6	1	10	5
8 "	2	1	3	0	1	1	34 "	9	11	3	5	5	7
9 March	1	2	2	0	1	1	35 "	3	7	3	9	12	6
10 "	0	7	1	0	0	1	36 September	13	8	7	7	11	9
11 "	1	11	1	0	1	1	37 "	12	6	6	19	15	8
12 "	0	10	0	0	2	0	38 "	8	7	4	20	6	7
13 "	0	18	0	0	3	1	39 "	14	5	3	28	7	7
14 April	1	8	3	0	1	1	40 October	13	9	4	10	14	9
15 "	2	5	1	0	0	1	41 "	8	12	8	5	9	8
16 "	0	6	3	1	2	1	42 "	8	16	3	3	10	8
17 "	1	3	2	1	2	1	43 "	10	9	4	3	5	7
18 May	1	10	1	0	1	1	44 "	2	10	4	5	9	5
19 "	1	5	2	2	1	2	45 November	6	8	3	3	13	5
20 "	1	5	1	0	1	1	46 "	2	7	4	4	14	4
21 "	3	2	2	2	0	2	47 "	17	5	3	3	6	5
22 "	0	1	2	1	5	2	48 "	9	2	2	5	4	4
23 June	0	5	2	5	3	3	49 December	3	3	2	7	3	4
24 "	2	4	4	2	3	3	50 "	3	0	8	2	1	3
25 "	1	4	3	1	1	2	51 "	3	4	2	2	7	3
26 "	2	4	3	2	3	3	52 "	3	1	1	0	0	2

The figures enclosed in a frame are omitted in calculating the "normalized average."

Manhattan		Previous Years						Normalized Average	Manhattan—Typhoid Fever By Wards 1911																					
		1906	1907	1908	1909	1910	1911		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
January	1	17	17	13	27	23	18	20	0.2	....	....	....	....	0.4	2 0.4	0.4	0.8	....	0.4	5 8.0	1	0.2	1	...	1 0.6	1 0.4	3 4.0	1.2	1 0.6	3 2.0
"	2	21	25	22	26	19	20	24	0.6	....	....	....	....	0.4	1.0	0.2	1 0.6	0.6	0.4	6 9.0	1 0.2	....	0.4	1 0.8	1 0.6	0.6	2 3.0	1 1.2	2 0.6	5 2.4
"	3	16	17	11	20	13	8	15	0.1	....	....	....	....	....	0.4	0.4	0.4	0.2	0.8	4.0	1	....	...	1 0.2	1 0.4	0.2	3 2.4	1 1.0	1.0	1 1.6
"	4	19	22	8	15	12	17	13	0.1	....	....	....	0.2	....	1	0.2	2 0.2	....	0.8	2 5.0	0.2	0.4	0.4	0.2	5 0.4	1 0.6	2 2.0	0.8	1 1.0	3 3.0
February	5	23	19	13	18	11	22	16	....	....	0.2	....	....	....	2 0.8	0.4	....	1	0.4	9 5.0	0.5	...	2	....	....	1 0.8	5 4.0	1 0.8	1.2	1 1.8
"	6	16	43	10	15	39	11	14	....	....	....	0.2	...	0.4	1 0.4	0.4	0.6	1 0.4	2 0.2	1 5.0	....	0.4	0.2	1.2	1 0.4	0.6	2 2.0	1 0.6	0.6	2 1.5
"	7	21	27	13	13	46	10	19	0.1	....	....	....	0.6	0.2	1.0	1 0.2	0.2	0.6	0.2	3 4.0	0.4	0.2	....	1.1	2 0.5	0.8	1 4.0	1.4	0.6	3 2.8
"	8	13	25	13	8	18	5	15	....	....	0.2	....	0.4	....	0.2	0.4	1 0.4	0.4	0.8	3 5.0	0.4	0.4	....	0.8	0.4	0.6	2.0	1.4	1.2	1 1.5
March	9	16	29	16	0	15	18	12	....	....	....	....	....	....	2 0.4	....	2	0.6	0.4	5 6.0	0.4	0.2	1 0.6	0.4	3 0.2	...	4 2.4	1.6	....	1 1.0
"	10	6	38	10	16	12	10	11	0.4	....	....	0.2	0.2	....	0.8	....	1 0.4	0.4	2 0.4	4 3.0	....	....	....	0.2	1.2	0.4	2 1.6	0.8	1.0	1 0.3
"	11	14	79	18	15	15	12	15	0.2	....	....	....	....	....	1 0.6	0.6	0.6	0.2	....	7 5.0	0.2	1 0.2	....	0.4	0.4	0.8	3.0	0.8	1.3	3 0.8
"	12	14	106	12	10	14	14	12	....	....	....	0.2	0.2	....	0.6	....	2	0.4	0.6	7 3.5	....	1 0.6	0.6	0.4	0.8	0.6	1.6	1 0.4	1 1.8	2 0.5
"	13	11	80	9	7	17	9	11	0.2	....	....	0.2	0.2	....	1 0.2	0.6	1.0	....	0.6	3 5.0	0.6	0.2	0.4	1 1.0	1 0.4	0.2	1 1.0	1.0	1.0	2 0.8
April	14	14	54	13	10	9	12	11	0.4	....	....	....	....	0.2	0.6	0.2	0.4	1 0.2	1	4 4.0	0.6	....	0.2	0.6	1 1.4	0.2	1 0.5	1 0.6	2 0.3	1 1.3
"	15	24	72	10	7	17	13	17	0.2	....	....	....	0.4	....	1.2	0.2	....	0.2	0.4	3 4.0	....	....	0.2	0.8	1 0.4	1 0.8	3 2.3	1.0	2 1.5	3 0.8
"	16	16	66	10	5	11	11	10	0.4	....	....	0.4	0.2	1 0.2	0.5	....	0.2	0.2	0.6	3 2.5	....	0.4	1 0.2	0.2	0.8	2 0.6	1 1.3	2 0.6	0.3	1 1.5
"	17	7	56	17	11	14	18	12	....	....	....	0.2	....	....	2 0.3	0.4	0.4	1 0.4	1 0.6	8 3.0	0.4	0.6	1.0	0.6	1.2	3 0.2	0.8	1 0.6	2 0.3	1.5
May	18	9	56	15	8	15	21	12	1 0.2	....	....	....	0.2	1	0.6	0.2	....	0.8	0.6	9 4.0	....	0.2	....	1 1.0	1 0.6	2 0.2	0.3	1 1.2	1 1.0	4 0.8
"	19	14	35	17	15	13	14	15	0.4	....	....	....	....	....	1 0.4	....	0.8	0.8	0.4	7 8.0	0.6	....	....	1 0.4	1 0.4	....	2 2.5	1.2	1 0.6	1 2.0
"	20	9	41	12	12	22	18	14	0.4	....	....	....	0.2	....	0.5	1	0.6	0.2	1 0.8	5 7.0	0.2	0.4	0.4	0.8	3 0.2	1 0.6	2 1.4	3 1.8	1.2	2 0.8
"	21	18	22	11	13	14	17	14	....	....	....	....	0.4	1 0.4	2 0.4	0.2	1	1	3 0.4	4 6.0	0.2	....	....	0.6	0.8	1.8	2 1.8	0.8	1 0.8	2 1.8
June	22	13	17	15	7	22	6	15	0.2	....	0.2	....	0.2	0.2	1 0.8	....	1.0	0.6	0.6	2 5.0	0.2	....	....	0.2	0.8	1 0.6	2 0.8	0.8	1.0	1.8
"	23	4	29	11	22	26	20	18	....	....	....	0.6	0.2	0.2	0.6	....	3 0.8	0.2	1 0.3	2 7.0	1 0.4	....	0.4	2 0.8	2 0.6	2 0.2	2 1.2	0.6	1.0	5 3.0
"	24	21	21	16	19	25	44	18	0.4	....	0.2	0.2	0.2	0.2	2 0.2	....	1 0.6	0.2	1 0.6	9 4.0	0.3	1 0.4	1	....	0.6	2 0.0	11 2.0	1 1.4	1 1.0	14 3.0
"	25	15	38	19	12	11	37	19	0.2	....	0.2	0.2	....	0.2	0.6	1 0.2	0.6	0.6	0.8	8 6.0	0.4	1 0.4	0.2	2 0.4	2 0.6	3	5 3.4	4 0.6	1 0.8	10 2.0
"	26	17	32	27	19	19	35	22	....	....	....	....	0.4	1	1 0.2	0.2	1.4	....	0.2	8 8.0	1 0.2	5 0.2	0.2	1 0.2	1	2.0	6 1.4	1 1.6	1.8	10 2.8
July	27	15	23	11	20	19	24	16	0.2	....	....	0.2	1 0.2	1 0.2	0.2	0.4	1.0	....	1 0.4	7 5.0	0.4	....	0.4	0.4	1.2	0.8	2 2.4	1.0	2 0.6	10 2.6
"	28	27	27	35	6	21	47	23	....	....	0.4	1 0.2	....	....	1 1.2	0.4	0.6	1 0.8	0.2	15 8.0	0.6	0.4	....	0.6	0.6	4 0.2	5 0.6	3 1.8	2 1.0	15 1.4
"	29	28	29	21	29	28	53	27	....	0.2	0.2	1 0.2	....	0.4	1.4	0.2	0.8	0.8	2 0.8	13 6.0	0.6	0.2	....	1.0	0.4	2 0.2	4 4.0	9 1.8	3 0.8	19 4.8
"	30	47	45	29	28	62	80	37	0.2	....	1 0.6	....	....	0.4	3 0.6	1 0.4	1.8	1.0	1 1.6	20 12.0	0.4	0.6	2 0.6	5 1.0	2 1.8	1 0.8	6 3.2	5 2.8	1 1.8	32 10.0
August	31	41	44	28	14	60	82	32	0.2	....	0.2	0.4	0.2	1	1.4	1 0.2	3 0.8	0.2	2 1.0	18 10.0	1 0.6	1 0.2	1 0.8	4 1.0	1 1.0	1 1.2	13 4.0	4 3.0	1.6	31 5.8
"	32	45	42	57	32	53	86	44	....	....	0.2	....	0.2	....	1.6	1 0.8	2 2.5	0.2	2 1.4	26 11.0	1 0.4	1 0.6	0.6	3 0.6	1 1.8	7 1.2	7 5.4	14 2.0	2 1.5	26 6.4
"	33	56	48	72	20	54	88	49	1 0.4	....	0.4	1 0.2	0.6	0.4	1 2.0	1 1.0	1 1.5	2	1 1.2	22 12.0	1 0.2	0.8	1.2	4 1.6	3 1.6	3 0.4	13 5.0	3 4.0	2 2.0	29 6.2
"	34	66	75	61	46	61	61	62	0.4	0.2	2 0.4	0.2	0.8	2	2.4	1.0	2 3.3	2.0	2 1.6	23 17.0	1 0.6	1.0	1 0.6	2 1.8	2 1.8	4 3.0	7 4.0	3 4.4	1 2.3	9 6.6
"	35	45	53	81	78	104	67	62	....	0.2	0.6	2 0.6	0.4	3 0.4	2 2.4	1 0.8	1 3.5	0.8	1 3.0	23 24.0	1.2	1.0	0.8	1 1.8	1.8	1 2.2	10 7.5	3.4	7 2.3	15 6.1
September	36	81	64	75	99	107	59	73	....	0.2	0.2	0.4	....	1.0	2 2.8	....	2 2.8	1 1.2	3 2.4	21 24.0	1 1.6	1 0.8	1.2	2 0.6	1.6	2.6	13 11.5	4 3.2	2 5.0	7 9.2
"	37	85	96	77	91	91	56	86	0.8	0.2	....	0.2	0.6	0.2	1 3.6	0.4	1 0.8	2 0.8	1 2.0	32 29.0	1 2.6	0.6	0.8	1 1.2	2 3.8	1 2.6	4 10.5	1 4.0	1 4.8	9 9.8
"	38	74	92	94	147	61	86	87	2 0.8	....	0.4	0.2	2 0.6	....	4 0.5	1 0.8	1 2.3	1.0	1 3.1	38 31.0	1.8	1 0.4	1 0.8	2 1.0	1 1.4	2 3.8	15 10.0	3 3.4	1 3.0	11 6.3
"	39	67	86	70	120	76	75	74	0.4	....	0.4	3 0.2	1 0.2	0.8	2 3.0	2 0.6	6 2.0	2.1	4 2.4	24 27.0	1 1.3	0.6	0.6	4 1.4	2 4.6	3 3.4	6 8.5	4 3.2	2 3.5	11 7.3
October	40	71	82	46	69	85	56	67	0.2	0.2	....	0.4	0.6	1 0.4	1 2.6	1 1.2	5 1.8	1.6	1.2	16 22.0	2 0.8	0.6	1 1.0	1 1.4	4 2.8	2 2.0	6 9.0	7 3.8	3 2.3	6 10.0
"	41	60	87	49	45	87	40	60	0.8	0.2	0.3	0.2	0.6	0.4	2 0.8	1 1.0	3 2.8	1 0.8	2 3.0	13 19.0	1 1.8	0.4	0.8	1 0.8	1 2.0	1 2.5	6 11.5	1 3.8	1.5	7 8.4
"	42	70	56	52	30	49	62	51	0.8	....	....	1	0.2	0.2	2 1.2	1 0.6	4 2.2	1 0.8	4.0	22 18.0	0.8	0.2	1.3	1.8	3 1.8	3 3.0	9 5.0	5 3.0	2.5	11 6.0
"	43	61	56	44	35	50	63	49	0.6	....	....	....	....	....	1 2.0	0.8	6 2.0	1.2	1 1.4	21 15.0	1.2	0.6	1 1.6	1 1.4	2 1.4	2 1.8	9 7.0	3 1.6	4 4.0	12 6.2
November	44	49	49	42	40	35	55	42	2 0.2	....	0.2	....	....	0.2	3 1.8	0.6	2 2.0	2 1.2	4 1.4	20 14.0	2 0.8	0.6	2 1.0	1 1.6	2.0	1 1.4	3 5.4	1 2.0	3 3.0	9 6.0
"	45	69	42	24	32	86	53	33	....	....	....	2 0.2	....	1	2 3.0	1 0.6	3 0.8	1 1.2	2 1.6	12 15.0	1 0.5	1	1.0	1 2.3	3 1.4	2 0.6	2 7.0	3 2.0	2 3.4	14 5.0
"	46	50	41	49	36	72	54	42	1 0.8	....	....	0.6	1 0.4	1	1.8	1 0.4	0.8	2 0.4	7 0.6	16 12.0	5 0.8	1.0	1.2	1 1.2	1 2.2	0.8	6 6.0	5 2.8	1 1.8	6 4.3
"	47	58	30	35	35	32	48	33	....	....	....	0.2	0.2	0.6	1 1.2	1 0.2	1 1.6	1 0.8	1 1.8	18 11.0	0.4	0.3	0.6	1 0.8	5 1.0	1.0	12 4.0	2 2.6	1 2.0	4 4.3
December	48	43	23	22	22	17	42	25	0.2	...	....	0.2	0.2	0.2	1.0	0.2	2 0.6	0.4	1 0.4	17 7.0	0.4	0.6	0.2	0.2	7 0.4	0.8	6 4.0	3 1.2	2.0	6 4.5
"	49	34	22	33	43	24	46	31	....	...	....	1 0.2	0.2	1.0	2 1.0	0.2	2 1.0	0.5	1.2	20 8.0	1 0.2	1 0.2	0.6	1 0.8	3 1.0	1 1.0	1 5.0	3 0.8	1 1.8	9 4.5
"	50	30	21	21	14	32	38	23	0.2	...	0.2	...	0.4	....	0.8	1	1.4	1 0.4	0.8	12 5.0	1 1.0	0.4	0.8	1 1.0	7 0.2	1.4	5 3.4	1 2.0	1 1.2	8 2.4
"	51	30	26	30	10	22	29	24	...	...	...	...	0.4	..	1 0.8	2 0.2	0.2	....	....	12 8.0	1 0.2	0.2	...	0.8	1 0.4	0.2	4 5.6	1 0.6	1 0.2	6 3.6
"	52	20	16	21	4	21	30	16	1 0.4	1	...	...	...	...	3 0.6	1 0.4	2 0.8	1 0.2	1 0.4	6 5.5	0.6	1 0.2	1	0.4	1 0.4	1 0.8	2 3.6	2 0.8	1 0.4	5 1.0

In the construction and use of such a table two things should be borne in mind. First, it is important that the geographical districts be neither very large or very small. In the former case, the resulting number of cases reported from that district will be too large to reflect readily any abnormal occurrence of the disease being studied; if too small, the statistics will suffer from embracing too few cases to admit of any fair analyses. In the second place, whatever districts are once laid out should not be changed from year to year, because an important function of these normalized averages is to reflect the normal incidence of the district for a period of years. In case a district becomes too large, owing, for example, to a rapid development of sections previously little built-up, it may be divided, but care must be taken not to disturb the original boundaries. When so divided, it is advisable to have an accurate census made of the several parts, to serve as a guide for the incidence of infections reported.

A similar normalized average is calculated for every ward in each borough, and for each borough as a whole. The method of using such normalized averages is well shown in the following reproduction of the figures showing the cases of typhoid fever reported in the Borough of Manhattan in 1911.

The weekly returns for each ward are inserted in the proper place as soon as available, and any disparity between the recent returns and the normalized average for that week is at once apparent. A glance at the above table shows that in the twenty-second ward the figures rose considerably above the normal in the middle of June; a similar rise was noticed also in several other wards, but not throughout the city. With the following week the condition was accentuated, and at once led to careful studies as to the origin of this increased prevalence of typhoid fever in these wards. A little later we see a marked increase in the returns from the Bronx. (Wards 23 and 24.) It is clear that analysis of the reported cases on this ward basis will yield ever so much more information than an analysis based merely on the returns from an entire borough or from the entire city. An increase in cases sufficient to arrest attention when in the ward returns may be entirely obscured when the returns embrace the figures from an entire borough. The value of these normalized ward averages is, therefore, two-fold: First, the recognition of any undue number of cases of the disease, and Second, the light the ward returns shed on the probable source of the infection. It is obvious that an increased prevalence of typhoid fever in practically all the wards of a city has an entirely different significance than one limited to but one or two wards. Similarly, if only one borough is affected, a factor common to all the boroughs cannot be involved.

It may, however, happen that cases distributed over different parts of the city still have a common origin. This is often true of milk-borne infections, especially when the milk is distributed by a large wholesale dealer. In order to afford a ready means of recognizing connected cases of this kind, it is necessary to keep a tabulation showing at a glance the number of cases of typhoid fever occurring among the customers of each wholesale milk dealer. This will be gone into again in discussing milk infections. At the present time, I wish merely to call attention to this method of recognizing any unusual prevalence of typhoid fever. The following form of record now used in our work is in the form of a large wall chart:

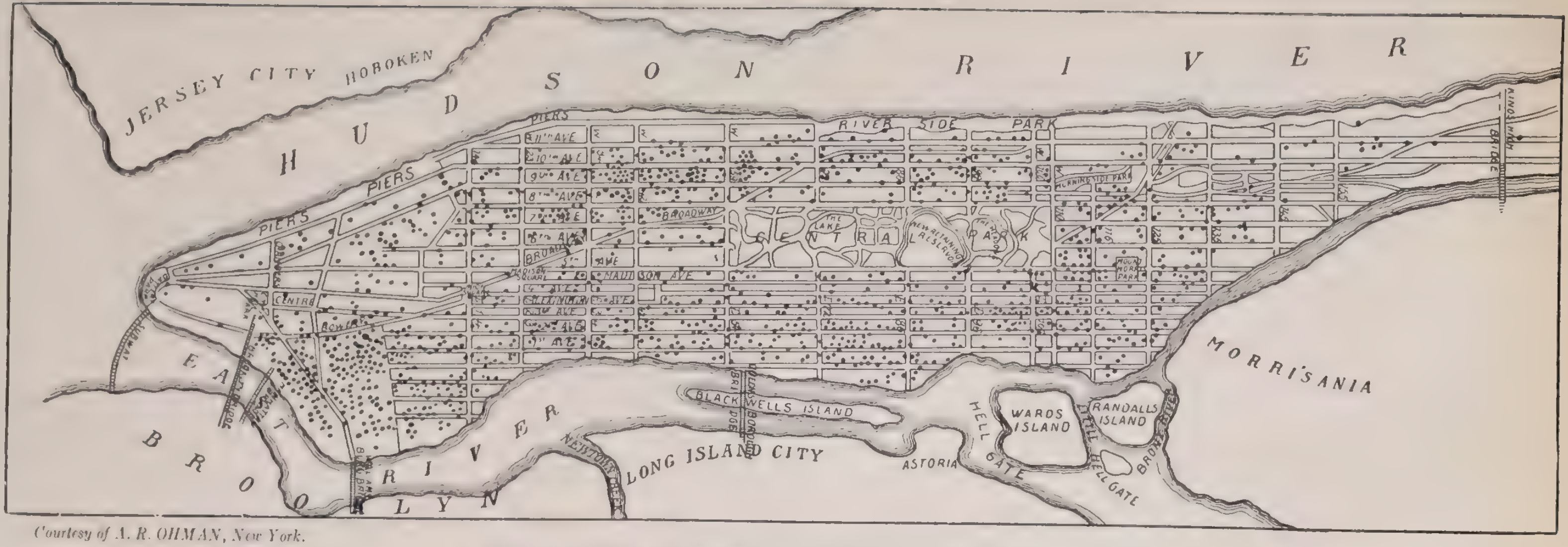
Dealers	Approximate average daily sales in quarts		Onset during week ending					
	Raw	Past'd	Jan. 6	Jan. 13	Jan. 20	Jan. 27	Feb. 3	Feb. 10
Beakes Dairy Co........								
Borden's C. M. Co.......								
Blake-Luke								
Bosch's Sons, John......								
Briarcliff Farms								
Bronx M. & C. Co.......								
etc								
X. Co..................	**7,500**	30,000		|||	||	||||| |||		
Y. Co..................	**20,000**	3,000		|	|||	||	||||	||||

Just as tabulations of cases from an entire borough may often fail to disclose abnormal groupings which readily appear in ward tabulations, so in the case of milk-borne infections, tabulations showing the number of cases occurring among the customers of each milk dealer sometimes may not suffice to disclose an abnormal incidence occurring with some particular milk dealer. This, of course, is true only with the large milk companies. We have, therefore, devised another form of record to help call attention to an abnormal incidence of infections, namely, a tabulation of the creameries from which the supply used by a given patient during the three weeks prior to onset was drawn. Such a tabulation is useful only in those cases where the milk from each creamery is sold at retail as it comes from the creamery and is not first mixed in the city with milk from other creameries. The tabulation shown herewith is in the form of a large wall chart so that the information is always in plain sight:

Creamery.	Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
A. Afton..............5,000 qts.												
Albion.............1,600 qts.												
Alliance............3,500 qts.												
B. Bennings												
Burlington												
Brewsters												

Recording the cases by means of pins or tacks inserted in large scale maps is often of considerable value in indicating the manner of infection and should constitute one of the routine procedures in keeping track of typhoid fever. In order, however, to obtain the greatest possible advantage from this pin-map method of analyzing the reported cases, it is important to have indicated on the map as nearly as possible the various water supplies, for in most large cities, owing to the incorporation of outlying towns, there are districts having distinct water supplies. For example, the Borough of the Bronx is supplied mainly by water from the Kensico reservoir, which is entirely independent of the Croton water. Considerable portions of the borough, however, receive Croton water. The map here reproduced was prepared for us by the engineers of the Department of Water Supply, and shows shading all the streets supplied with Kensico water. The streets unshaded have Croton water, or no mains of any kind have yet been laid. During the water-borne outbreak of typhoid fever in New York in 1907 the cases were quite uniformly spread throughout the Borough of Manhattan, but in the Bronx were largely limited to the section supplied with Croton water.

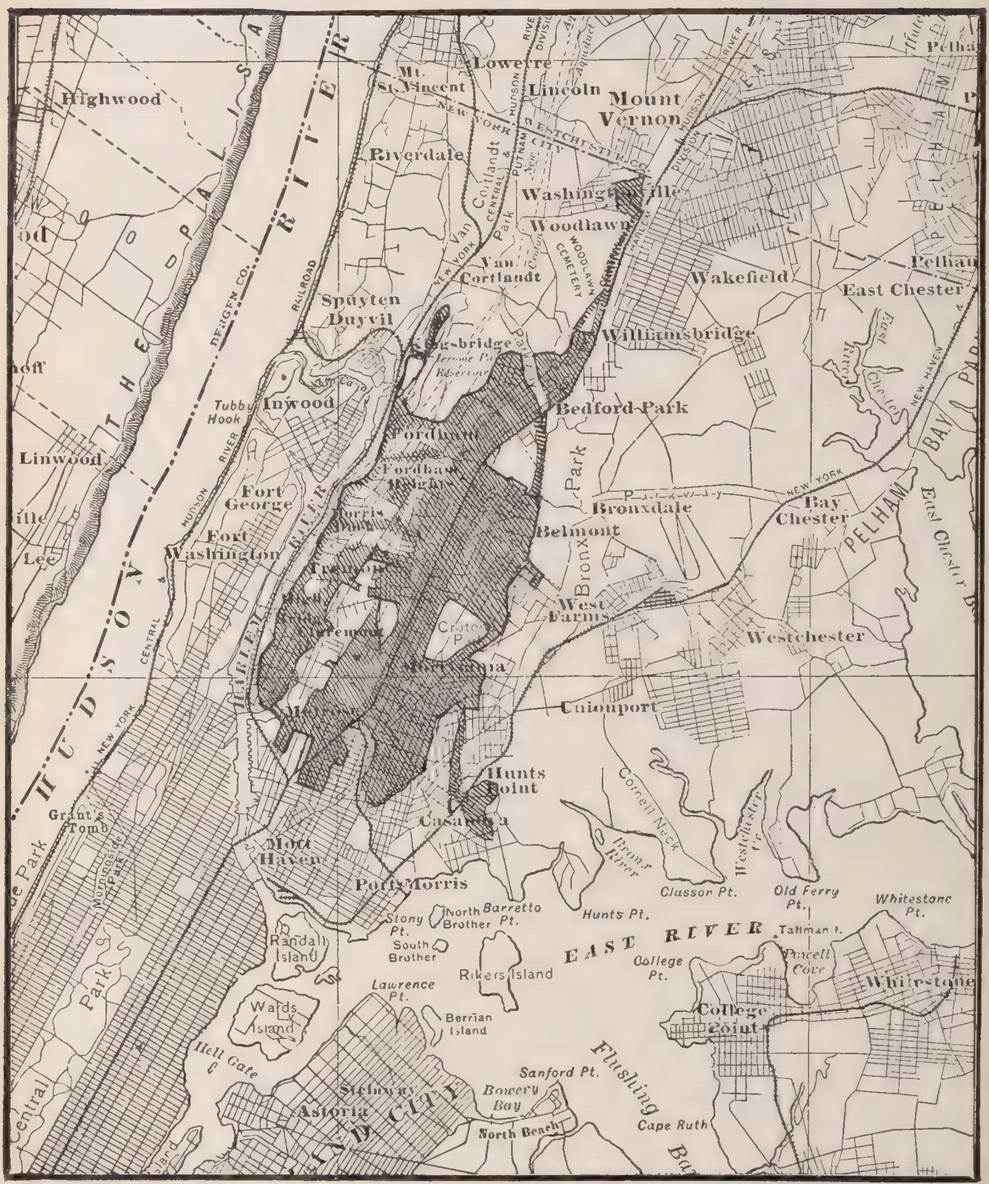
The usefulness of such a map in indicating whether or not a given out-



Courtesy of A. R. OHMAN, New York.

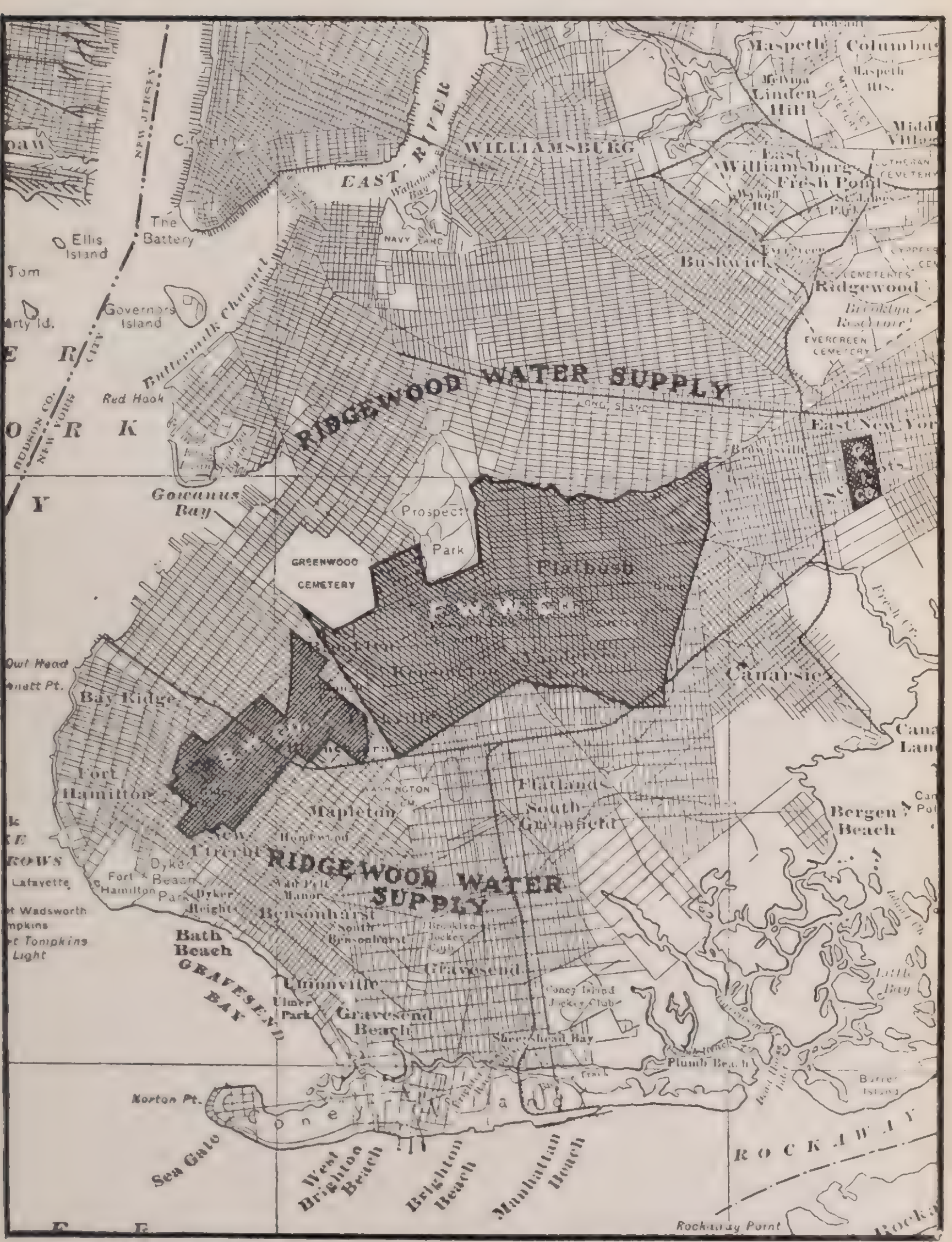
Pin Map to Study Geographical Distribution of the Cases.

Note. (In this reproduction, many of the streets have been omitted. The original map is about 8 feet long.)



Courtesy of A. R. OHMAN, New York.

Borough of The Bronx, showing Kensico Water Supply in heavy shading. The rest of the borough is supplied with Croton water.



Courtesy of A. R. OHMAN, New York.

Borough of Brooklyn, showing the various water supplies.

break of typhoid fever is water-borne can be increased by indicating, with pins or tacks of a particular color, just which cases have been drinking bottled water. Naturally a large proportion of such tacks would cause one to investigate the possibility of infection from this cause. Moreover, it is well, in using the maps, to have a special color tack to indicate cases which could not possibly have become infected in town.

INVESTIGATION OF THE INDIVIDUAL CASES.

In attempting to trace the source of infection it is imperative that complete and accurate data be compiled from individual cases. In smaller communities it may be feasible for a single trained investigator to secure all the necessary data from the patient, his physician, or family; in a large city, however, recourse must be had to blanks to be filled in, either by the attending physician or by medical inspectors. It is surprising to see how much the individuality of the inspector determines the character of the data secured. From my experience I am convinced that it is important to have a small number of well-trained inspectors for this work alone, and not divide the cases among a large number of inspectors doing work along other lines also. (School inspection, other contagious diseases, disinfection.) In the study of the cases occurring in New York, we make use of the following blank prepared by the Division of Communicable Diseases. (See page 352.)

Name, age, marital state, color, nationality, and address are almost wholly desired for purposes of identification of the patient. A study of the age groupings, however, often yields important suggestions regarding the probable causes of infection.

It is very important to know the occupation of the patient, in order to take the necessary steps against a spread of the infection. Taken in connection with the date of onset, a knowledge of the patient's occupation may occasionally serve to explain subsequent cases.

It is important to have the name and address of the physician who reported the case in order to be able, if necessary, to make further inquiries.

The same is true of the heading "Removed to a Hospital."

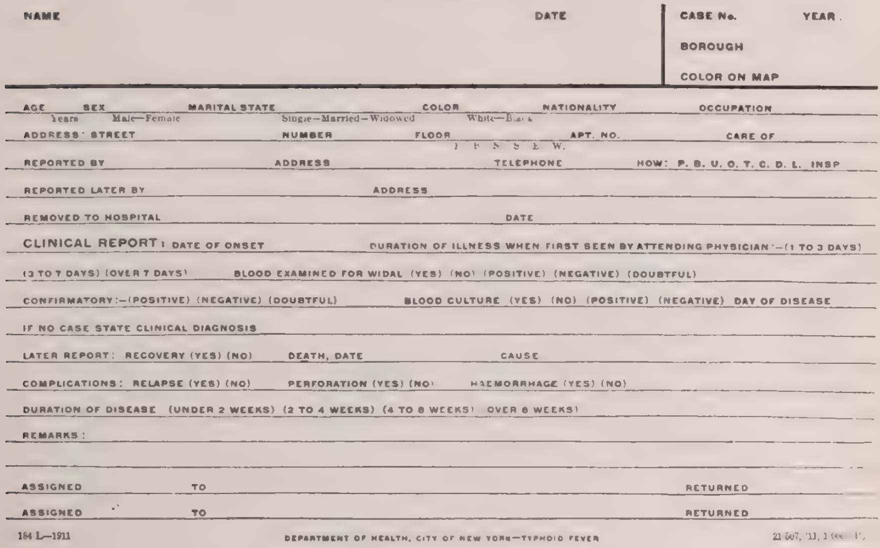
The importance of a careful analysis of the dates of onset will be discussed subsequently.

The questions concerning the duration of illness, when the case was first seen by a physician, and the data concerning the blood examination are needed in order to enable the one who studies the reports to form an idea as to the correctness of the diagnosis.

It is obvious that only true cases of the disease should be tabulated, hence the inquiry concerning "No case."

The occurrence of relapses, perforations and hemorrhages should be

(Front of Card.)



NAME DATE

CASE No. YEAR

BOROUGH

COLOR ON MAP

AGE Years SEX Male—Female MARITAL STATE Single—Married—Widowed COLOR White—Black NATIONALITY OCCUPATION

ADDRESS: STREET NUMBER FLOOR APT. NO. F. R. N. S. E. W. CARE OF

REPORTED BY ADDRESS TELEPHONE HOW: P. B. U. O. T. C. D. L. INSP

REPORTED LATER BY ADDRESS

REMOVED TO HOSPITAL DATE

CLINICAL REPORT: DATE OF ONSET DURATION OF ILLNESS WHEN FIRST SEEN BY ATTENDING PHYSICIAN:—(1 TO 3 DAYS)

(3 TO 7 DAYS) (OVER 7 DAYS) BLOOD EXAMINED FOR WIDAL (YES) (NO) (POSITIVE) (NEGATIVE) (DOUBTFUL)

CONFIRMATORY:—(POSITIVE) (NEGATIVE) (DOUBTFUL) BLOOD CULTURE (YES) (NO) (POSITIVE) (NEGATIVE) DAY OF DISEASE

IF NO CASE STATE CLINICAL DIAGNOSIS

LATER REPORT: RECOVERY (YES) (NO) DEATH, DATE CAUSE

COMPLICATIONS: RELAPSE (YES) (NO) PERFORATION (YES) (NO) HAEMORRHAGE (YES) (NO)

DURATION OF DISEASE (UNDER 2 WEEKS) (2 TO 4 WEEKS) (4 TO 8 WEEKS) (OVER 8 WEEKS)

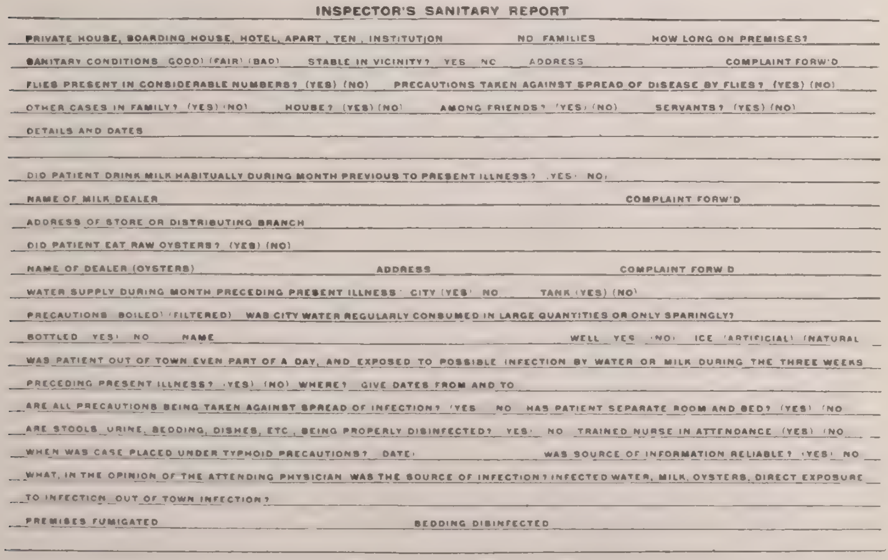
REMARKS:

ASSIGNED TO RETURNED

ASSIGNED TO RETURNED

184 L—1911 DEPARTMENT OF HEALTH, CITY OF NEW YORK—TYPHOID FEVER 21 607, '11, [illegible]

(Back of Card.)



INSPECTOR'S SANITARY REPORT

PRIVATE HOUSE, BOARDING HOUSE, HOTEL, APART., TEN., INSTITUTION NO. FAMILIES HOW LONG ON PREMISES?

SANITARY CONDITIONS (GOOD) (FAIR) (BAD) STABLE IN VICINITY? (YES) (NO) ADDRESS COMPLAINT FORW'D

FLIES PRESENT IN CONSIDERABLE NUMBERS? (YES) (NO) PRECAUTIONS TAKEN AGAINST SPREAD OF DISEASE BY FLIES? (YES) (NO)

OTHER CASES IN FAMILY? (YES) (NO) HOUSE? (YES) (NO) AMONG FRIENDS? (YES) (NO) SERVANTS? (YES) (NO)

DETAILS AND DATES

DID PATIENT DRINK MILK HABITUALLY DURING MONTH PREVIOUS TO PRESENT ILLNESS? (YES) (NO)

NAME OF MILK DEALER COMPLAINT FORW'D

ADDRESS OF STORE OR DISTRIBUTING BRANCH

DID PATIENT EAT RAW OYSTERS? (YES) (NO)

NAME OF DEALER (OYSTERS) ADDRESS COMPLAINT FORW'D

WATER SUPPLY DURING MONTH PRECEDING PRESENT ILLNESS: CITY (YES) (NO) TANK (YES) (NO)

PRECAUTIONS (BOILED) (FILTERED) WAS CITY WATER REGULARLY CONSUMED IN LARGE QUANTITIES OR ONLY SPARINGLY?

BOTTLED (YES) (NO) NAME WELL (YES) (NO) ICE (ARTIFICIAL) (NATURAL)

WAS PATIENT OUT OF TOWN EVEN PART OF A DAY, AND EXPOSED TO POSSIBLE INFECTION BY WATER OR MILK DURING THE THREE WEEKS PRECEDING PRESENT ILLNESS? (YES) (NO) WHERE? GIVE DATES FROM AND TO

ARE ALL PRECAUTIONS BEING TAKEN AGAINST SPREAD OF INFECTION? (YES) (NO) HAS PATIENT SEPARATE ROOM AND BED? (YES) (NO)

ARE STOOLS, URINE, BEDDING, DISHES, ETC., BEING PROPERLY DISINFECTED? (YES) (NO) TRAINED NURSE IN ATTENDANCE (YES) (NO)

WHEN WAS CASE PLACED UNDER TYPHOID PRECAUTIONS? (DATE) WAS SOURCE OF INFORMATION RELIABLE? (YES) (NO)

WHAT, IN THE OPINION OF THE ATTENDING PHYSICIAN, WAS THE SOURCE OF INFECTION? INFECTED WATER, MILK, OYSTERS, DIRECT EXPOSURE TO INFECTION, OUT OF TOWN INFECTION?

PREMISES FUMIGATED BEDDING DISINFECTED

noted not merely because of their statistical value, but also because they aid in the diagnosis.

This applies also to the "Duration of the Diseases," the answer to which question is filled in only when the case has terminated.

The desirability of data concerning the sanitary condition of the house, the number of families living therein, and how long the patient has lived there, are obvious. It sometimes happens that the patient's address is correctly given, but inquiry reveals that he resided there since but a few days before the onset of the disease. It is apparent that the inquiries concerning the patient's surroundings, his milk and water supply, etc., must be made at the previous address. The importance of knowing whether there is a stable in the vicinity of the patient's home comes from our knowledge of fly transmission as is indicated by the next query.

In answering the question concerning other cases in the family, etc., a great deal depends on the ability of the inspector making the investigation. It is important to get the dates and place of onset of each of the other cases, as well as some facts concerning the probable source of their infection. In fact, all the data demanded for the original case should be obtained, if possible, so as to furnish a guide to the person subsequently analyzing the information obtained by the inspectors.

The question concerning milk drinking must be carefully gone into. A great many individuals will deny ever drinking raw milk, and if this is really the case it is practically impossible to include them, except as secondary cases, in a milk-borne outbreak of typhoid fever. As a matter of fact, however, many people often overlook the fact that they take raw milk or cream on cereal in the morning, or with fruit (peaches and cream, berries and cream, etc.).

When the use of uncooked milk is reported in a case which appears in every other particular to belong to a certain group of milk-borne infections, it is well to make a second visit to ascertain the correctness of the data originally obtained. This, of course, applies also to any other seeming exception.

The reason for asking the name of the retail milk dealer and the wholesale dealer is obvious. The method of tabulating and analyzing the data concerning the milk supply will be discussed later.

With a disease so often water-borne as typhoid fever the need of accurate information concerning the water drunk by the patient prior to the onset is apparent. Certain features of water infections will be discussed subsequently.

The data concerning a possible infection through oysters or clams are important, as now and then outbreaks of typhoid fever have been traced to this source, especially in England. At the same time, unless the sale of oysters be controlled along lines similar to those governing the sale of milk, it will require extended investigations to trace the infection to its original source. Some years ago, a number of persons were apparently thus infected by eating infected oysters at a banquet in this city, and it is under circumstances like this that the discovery of oyster-borne infections may now and then succeed. So far as the extent of oyster-borne typhoid fever in this city is concerned, it may be added that the usual increased incidence of typhoid infections corresponds to the season (June July and August) when oysters are not generally eaten.

RECORDS AND FILES.

Journal, in which the cases are entered seriatim according to the date reported. Each case is given a serial number. The data entered are the name, address, age, date of report, date of onset, together with the dates when the case was assigned to an inspector for investigation, when returned, and remarks. .

History Card. This is described elsewhere. The cards are all carefully looked over on their return by the inspector, in order to make certain that all the data have been properly obtained. In fact, it is advisable to enter the data into a large book, case by case, so as to check up the completeness of the inspector's report. The cards are filed according to address.

Milk Card. This has also been described elsewhere. From the card the wholesale dealer's name is noted, and the case charged against the dealer on the large tabulation already described. This card is then sent to the MILK DIVISION, where the milk data are examined. In the case of dipped milk, and where the back of the card shows the creamery tags found by the inspector, these names are entered on the "creamery tabulation." In the case of bottled milk, inquiry is made of the company supplying the milk in question as to just what creameries shipped milk into the affected district. The milk cards are filed under the name of the wholesale dealer.

Milk Division Journal. In this each case reported is entered seriatim, and the date of onset, age, retail milk dealer, wholesale dealer, and the various creameries supplying this milk during the three weeks prior to the onset of the disease.

Milk Dealers' Tabulation as well as Creamery Tabulation is made up in this office from the information on the milk cards and from that subsequently obtained from the milk companies.

Widal tests and Diazo tests made in the Diagnosis Laboratory are filed away by means of the slips accompanying the specimens, arranged by address. Cases discovered or confirmed by means of laboratory tests are at once notified to the Record Clerk of the Division of Communicable Diseases for record in the Journal above mentioned.

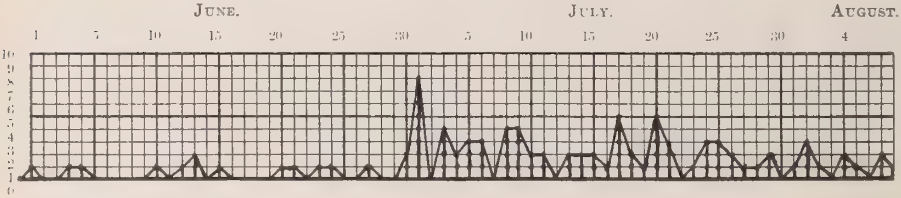
These constitute the Basic Records from which the studies outlined in the following are made.

THE STUDY OF THE DATA OBTAINED.

For the purposes of orientation it is well to make several preliminary tabulations. For obvious reasons it is important to sift out as many of the cases not connected with the outbreak as possible. Hence it is wise in localized outbreaks in a city, to study merely the cases within a given district. In New York City, it is often necessary to analyze merely the cases occurring in one ward to obtain the correct clue. If the abnormal increase in the number of cases appears to be confined to the users of one particular milk supply, it is important to study these cases separately. The next point to inquire into and to tabulate is the date of onset of the individual cases. It is sometimes advantageous to combine this tabulation with the address of the patients. Now and then it happens that this discloses a group of cases located within but a short distance of each other infected at the same time, followed by other groups with later onsets. When there is a marked increase in typhoid fever in several wards in the city, it is of the greatest importance to make comparisons of the dates of onset in these various groups. This will occasionally bring to light unexpected connections between the various cases.

"X" MILK CASES. From 14th to 100th Street, West Side.

1911.



The tabulation of the dates of onset may show whether infection occurred but once or repeatedly. If the former is the case we shall have the majority of cases with onsets all within several days of each other; the rest of the cases are scattered both before and after that period. The period during which cases may develop, from an infection taking place but once, varies somewhat; roughly speaking, it lasts about two weeks. Repeated infections manifest themselves in such a tabulation of onsets by repeated groups of cases on or about one day. Care must be, however, exercised in the interpretations of these tabulations. The occurrence of secondary cases may simulate a renewed infection.

Another thing to be learned from a study of the onsets is the probable mode of infection. The explosive character of milk-borne outbreaks of typhoid fever is well known. Onsets scattered along over a considerable period are more likely to be due to water infection or fly transmission, but do occur even with milk-borne infections.

In an outbreak recently studied both characteristics were observed, as can be seen from the above chart showing the onsets of the cases. It will be noted that there are scattered cases throughout the month of June and that the picture, at this time, does not resemble that ordinarily seen in milk-borne infections. From the first of July on, the number of cases suddenly rises and continues high throughout the month and well into August. Despite the difference in the grouping of the cases in June and in July, all the cases belong together and were due to infected milk.

In this connection, I may call attention to the fact that in all tabulations of this kind the first of the month is apt to have an undue proportion of cases charged against it for the reason that an occurrence within a few days of the first is apt to be reported as "on the first" or "about the first." That this accounts for the extraordinary rise on the first of July shown in the above table is rendered very probable by the fact that there are no cases whatever reported with onsets July 2nd.

(To be continued.)

American Journal of Public Health

Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. MAY, 1912. Number 5

$2.00 a year. 20 cents a copy.
LIVINGSTON FARRAND, M. D., Editor. SELSKAR M. GUNN, B. S., Managing Editor
PHILIP P. JACOBS, Ph.D., Business Manager.

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or opinions have been adopted by vote of the Association.

AN IMPORTANT STEP

To the State of New Jersey is to be credited the most progressive piece of antituberculosis legislation yet adopted in the United States, or, so far as we are aware, in the world.

Some two years ago a law was enacted in that State enabling counties to erect and maintain tuberculosis hospitals and as a result three such institutions were established. It quickly became evident that the desired provision for the segregation and care of tuberculosis patients would be indefinitely delayed unless additional measures were taken. In March last a new bill was introduced in the legislature, passed by both houses and having received the signature of the Governor is now a law. Its operation will be watched with intense interest by all those concerned with the problem of public health.

Without going into details, the essentially new features of the law in question are: mandatory establishment of county tuberculosis hospitals (instead of permissory as heretofore); a subvention by the state of three dollars a week for each patient cared for in such hospitals; and, more interesting than all, a clause is added providing for the compulsory segregation of such cases as may be adjudged guilty of violating rules and regulations in regard to tuberculosis which shall be issued by the State Board of Health. A provision of great practical importance is the placing of responsibility for enforcing the law upon the State Board of Health, which body is empowered to issue orders to local boards of health and practicing physicians for the purpose.

It is encouraging to see a commonwealth take the step which expert experience demonstrated as logical.

In the absence of specific curative or immunizing agents for tuberculosis, the line of attack against that disease must necessarily be that of prevention. It is clear that the chief point of attack must be the bacillus itself. It is increasingly evident that the most effective weapon is isolation of the infecting focus and this means nothing else than segregation of dangerous cases of consumption. It is obviously idle to order the segregation of such patients unless provision is made for their reception and maintenance. It is the frank recognitions of these implications of the situation which gives the New Jersey law its significance. A few other states, or, in some cases, cities, have adopted mildly mandatory legislation but invariably of an incomplete sort which has not met the conditions even in a theoretical way.

It remains to be seen, naturally, how this new law will work out in practice. Wisdom and tact will be demanded to an extraordinary degree. Modifications and amendments will doubtless be found necessary. Great responsibility is placed upon the shoulders of the State health authorities but it is this supervision which gives the plan its chances of success. We believe the law to be logical and in the line of inevitable development. In its essential features we believe it to be practicable and we congratulate New Jersey upon having a assumed incontestably the leading position in the formal official treatment of the tuberculosis problem.

DOCTOR SAMUEL H. DURGIN

The health officers of the four countries represented in the Amerian Public Health Association will learn with profound regret of the voluntary retirement of Dr. Samuel H. Durgin from his life work. Doctor Durgin entered the public health service in 1867 and for almost forty years has directed that service in the city of Boston. Such a length of service as health officer is probably unique, in the United States at least, where the demands of politics, rather than the qualifications of officials, has been too often the cause of change of officials. Doctor Durgin, however, has not held his position because of his ability as a political trimmer, but quite the reverse. Working in an atmosphere which at times offered little encouragement to efficient service but has rather demanded political subserviency, Doctor Durgin has thought only of the interests of Boston and his strict integrity, his high sense of duty and his great ability as an executive have won the support of many who secretly have desired to use his office for political purposes. Such a long and successful career is an inspiration and encouragement to those who believe that public office is indeed a public trust. Beginning his work during the dominance of the old school of sanitarians, and precluded by his duties from much personal research, he has, nevertheless, always been in close touch with scientific progress and has been quick to put its teachings in practice. He soon saw the fallacies of the old ideas that municipal cleansing is the all-in-all of sanitation, that disinfection is a panacea and quarantine a mere arbitrary detention. As a consequence, Boston was one of the first cities to make use of the bacteriological laboratory. Its maritime quarantine early became a model, through the adoption of scientific and effective methods in place of the less efficient but more burdensome restrictions of commerce which Doctor Durgin found in vogue. So too Boston was the first American city to organize a comprehensive system of school inspection, a system which has now been copied by hundreds of cities throughout the United States and Canada.

Doctor Durgin very early became a member of the American Public Health Association and has always continued one of its most active supporters, serving it in various capacities from President down, and always most efficiently with his wise counsel. He saw in the Association the one existing means for co-ordinating the public health work of the country and has probably done more than any other one man to keep the Association in touch with scientific progress, to make it a leader rather than a follower. Doctor Durgin also felt the need of a closer communication between the different health officials of his own state and he was one of the promoters, and has always been an active supporter of the Massachusetts Association of Boards of Health, one of the first and most successful organizations of the kind in the country. While the health officers of America will regret that Doctor Durgin will no longer set examples for them in municipal sanitation, the members of our associations hope that they will now see more of him at their meetings and listen more often to his words of suggestion and advice. We wish him the utmost pleasure in the well earned rest which he is about to enjoy.

C. V. Chapin.

A NOTABLE REPORT

The report of the Commission on Milk Standards of the New York Milk Committee just made public in Public Health Reports for May 10, 1912, must be considered a classical contribution to the literature on milk. The eminence of the seventeen gentlemen who served on this committee is sufficient guarantee of the soundness and excellence of the report. The commission was appointed as "a direct result of the observation of the New York Milk Committee that there was great incompleteness and lack of uniformity in the milk standards, milk ordinances, and rules and regulations of public health authorities throughout the country for the control of public milk supplies."

This report will doubtless receive the wide distribution that it deserves and should have a very direct effect in making reasonably uniform the various milk standards in all parts of the country. The recommendations might very suitably be adopted by any city or town in the country and are not specialized recommendations for the New York City milk problem.

A NEW METHOD FOR THE DISINFECTION OF TUBERCULOUS SPUTUM

Preliminary Report

DR. WM. ROYAL STOKES AND DR. W. N. SCHMITZ
Baltimore, Md.

Read before the Laboratory Section, American Public Health Association, Havana, Cuba, December, 1911.

The new method of disinfection for tuberculous sputum, which we have found serviceable, contains antiformin as its basis. The advantage in using this material consists in the quick solution of the mucus and pus contained in the material disinfected. Various quantities of carbolic acid and lysol have been added to pure antiformin and it has been found that smaller percentages of these disinfectants will destroy the tubercle bacillus in sputum when used in combination with antiformin than when simply dissolved in water. The antiformin by dissolving the mucus seems to allow the antiseptics to come into direct contact with the tubercle bacilli, and we believe that this method possesses this advantage over the ordinary solutions of disinfectants used for destroying the tubercle bacilli practically in sputum.

It was found that a 3% solution of carbolic acid in the entire mixture of sputum and antiformin representing a 6% solution of the carbolic acid in the antiformin itself would destroy the bacillus of tuberculosis in one-half an hour, and a similar strength of lysol killed the tubercle bacillus in 2 hours. Equal quantities of the sputum and antiformin solution were mixed so that the 6% solution in antiformin would represent a 3% solution in the mixture of antiformin and sputum. The viability of the tubercle bacillus was tested by subcutaneous injections into guinea pigs.

The practical work consisted of a series of experiments with various strengths of a solution of lysol and carbolic acid in antiformin. The method of procedure was as follows:

A specimen of sputum known to contain large numbers of tubercle bacilli was mixed with an equal quantity of antiformin containing from 2% to 6% of either carbolic acid or lysol. This mixture was shaken slightly, and at half-hour intervals 2 c.c. were pipetted off and centrifugalized. The sediment was washed twice with sterile water, mixed with 1 c.c. of normal salt solution, and injected subcutaneously into guinea pigs. A control pig was inoculated in every instance.

From the Bacteriological Laboratory of the State and City Boards of Health, Baltimore, Md.

A PRACTICAL MODIFICATION OF THE WINSLOW DIRT FILTER

M. C. Schroeder, M. D.
Department of Health, New York

The following apparatus is a modification and adaptation of the apparatus known as the Winslow Dirt Tester for the rapid determination of the amount of visible dirt in milk. This modification was designed primarily to overcome the difficulties which exist in testing the milk supply of New York City. These difficulties stated briefly are: 1st, those of transportation owing to the distant and varied points from which New York receives its milk supply; 2nd, the necessity of testing numerous samples of milk in a short space of time at their source in the country or upon its arrival at the wholesale plants in the city.

Winslow Filter

Individual Tester

The original Winslow Dirt Tester, which was first used in Chicago, consists of a small unit (see illustration) and is composed of two cylinders made of copper, one within the other. The outer cylinder is $7\frac{3}{8}$ inches long and $3\frac{3}{8}$ inches wide; this cylinder has a narrow piece of tubing fitted into the lower portion which is so arranged that it may be connected by means of rubber tubing with a hot water supply. In the upper portion of the cylinder is an opening providing an outflow for the water.

The inner cylinder is $7\frac{3}{8}$ inches long and $2\frac{1}{2}$ inches wide. At the bottom of this cylinder is an opening 1 inch in diameter. This opening is fitted on its outer side with a brass or copper ring surmounted by a smaller ring. There is also a removable cap with a detachable perforated brass disc. This cap is held in place by means of a copper wire. When the filter is to be used, a disc made of absorbent cotton is placed within the cap. The inlet tube is attached by means of rubber tubing to a hot water supply and the space between the 2 cylinders is filled with water. A quart of milk is poured into the inner cylinder and is filtered through the cotton. After the milk has passed through, the cotton is removed and the process repeated. This apparatus while efficient was not suited to the needs of New York City owing to the complications previously stated.

The following apparatus was therefore planned for the purpose of eliminating these difficulties. It consists of four parts: 1st, the individual tester; 2nd, the hot water tank or jacket; 3rd, the lamp; 4th, the reservoir or carrying case.

The individual tester consists of a cylinder 7½ inches long, 1¾ inches wide at top and 1¼ inches at bottom. It is made of spun copper brased, and is fitted at the bottom with a skeleton brass cap fitted with a shoulder. Attached to the cylinder is a copper catch holding a bent wire which clasps over the cap and holds it in place; inside of these skeleton caps are small removable perforated brass discs. The small discs of cotton are bought wholesale, and when the milk is to be tested, the cotton is placed in the cap on the disc and the cap is slipped into place.

The water jacket. This water jacket was found necessary owing to the fact that cold milk or milk with ice in it does not filter rapidly. At the same time, it permits a separation of the cream, which, being finally deposited upon the filter, covers over the sediment and does not permit a true estimation of the amount of visible dirt present in the milk.

The hot water jacket is a covered box-shaped tank having ten cone shaped cylindrical openings passing through its entire depth for the reception of the individual testers, and is provided with a water inlet, situated on its upper surface. A water outlet closed with a screw cap or cork is placed in the left side wall and a steam vent is located in the upper side wall. The jacket is 18 inches long, 6½ inches wide at the bottom; and 15 inches long; 6½ inches wide at the top; it is 7½ inches high and has a covered extension 2¼ inches high, 3 inches long, 6½ inches wide, for the direct application of heat. On the under surface of the hot water tank is a movable brass bar, 9 inches long. When the apparatus is to be used this bar is placed in a transverse position and acts as a support for the tank, when the tank is placed above the reservoir.

Lamp for use with the tester. The alcohol lamp, designed for this tester, was specially constructed for the purpose of giving the greatest amount of heat it was possible to produce. It consists of a powerful burner, regulated by a screw so that the flame may be raised or lowered and a reservoir 6 inches long, 2¾ inches wide; 2 inches high, for holding the denatured alcohol. The reservoir is fitted at each end with a shoulder piece, 2¾ inches wide, 6 inches high, which has a turned edge upon its upper side. This edge slips over a corresponding ridge on the extension and holds the lamp in place when the apparatus is in use.

Carrying case or Reservoir. It was found that the most convenient case for transportation was one capable of accommodating ten individual filters, together with the water jacket and lamp. The case was accordingly made of light copper, and had the following dimensions; length, 18½ inches; height, 10¼ inches; width 7 inches. The cover was hinged and closed anteriorly with a copper wire bolt as shown in the illustration. For convenience in carrying a leather handle was attached to the cover by reinforced metal strips on the interior of the cover. The case was also planned to act as a reservoir for the milk which was being passed through the filters. When the reservoir is filled, the milk may be drawn off, through the small detachable faucet shown in the illustration, directly into a milk-can. This milk-can may be iced if the season requires it by standing it in a box of ice. In this way, any loss of milk is obviated and the milk is not injured at all by the process; reaching the consumers a little cleaner for having undergone the filter test.

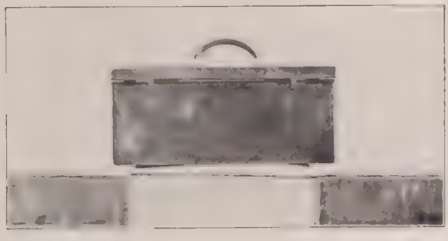
Tester ready for Use
a. Water Jacket *b.* Reservoir.

In testing out this apparatus at the creameries, we went provided with a quart dipper and two one quart measures; we, also, carried a number of one and one half inch square cards made of blotting paper. These were for the purpose of enabling us to fix the indentification of the milk which was being tested.

When the apparatus is to be used, the water tank is filled with hot water and by means of the brass bar adjusted over the reservoir. The lamp is filled with alcohol and placed under the extension, and lighted.

The faucet is attached to the reservoir and an empty can is placed underneath the faucet. When the milk is received at the platform the inspector stirs up the milk in the can thoroughly; dips out one quart, writes the number or name of the farmer upon a small white square, placing it between the individual tester and the cylinder in the water tank, and pours the milk through the tester. Owing to the heat provided by the hot water tank, the milk passes rapidly through the strainers. After the milk has been filtered the cottons are removed and placed upon the square blotters, which bear the name or the number of the dairyman. These filter cottons are allowed to drain and are thus ready for immediate inspection by the dairymen. If it is desired to forward these samples to the laboratory for grading, the cottons are allowed to dry and then carefully packed and forwarded to the city.

If a permanent record of these sediment tests is to be kept at the creamery, it is advisable to take a piece of board and cover it with zinc or glass, ruling upon its surface squares of two inches in diameter. In these squares the farmers' names may be placed so that when the filter cottons are removed from the filters they may be immediately placed on the squares; and thus identified, kept until investigation can be made concerning the conditions under which this milk was produced.



Case Ready for Transportation

The standard of dirt which the Department expects to adopt consists of four grades; slight, medium, excessive and maximum. It has not been decided whether the cottons are to forwarded to the laboratory for judgment or left to the judgment of the inspector. If they are to be left to the judgment of the inspectors, each inspector will be provided with a set of sample cottons, showing the grades of dirt mentioned. The maximum amount, permitted, will be that of the German Government, namely, 10 milligrams of dirt to every quart of milk.

This apparatus has been tested in a practical manner in a number of creameries and it was found that very little inconvenience was caused to the creamery operators.

If the creamery is a large one, 75 to 200 patrons, two men are required to run the test, so that the milk may not be delayed in shipment; one man to take the samples; the second man to run the filter. In this manner the milk may be handled as fast as it is brought in by the dairymen. Special investigations were also made of those dairies from which particularly bad sediments were obtained. It was found that, with few exceptions the bacteriological count and the sediment test tallied with the improper condition under which the milk was produced. Further work is being done along these lines. In closing I wish to express my thanks to Dr. W. H. Park, General Director of the Division of Laboratories for the many helpful and practical suggestions which have made this study possible.

AN INEXPENSIVE OUTFIT FOR THE COLLECTION OF BACTERIAL MILK SAMPLES

F. O. Tonney, M.D.
Director Health Department Laboratory, Chicago

Read before the Laboratory Section of the American Public Health Association, Havana, Cuba, December, 1911

The outfit here described was devised in the Health Department Laboratory, Chicago, about two years ago, and has been in continuous use since that time. It consists of a pint tin can, test tubes, pipettes, pipette can and alcohol lamp, all of which are carried in an ordinary inspector's leather sample case.

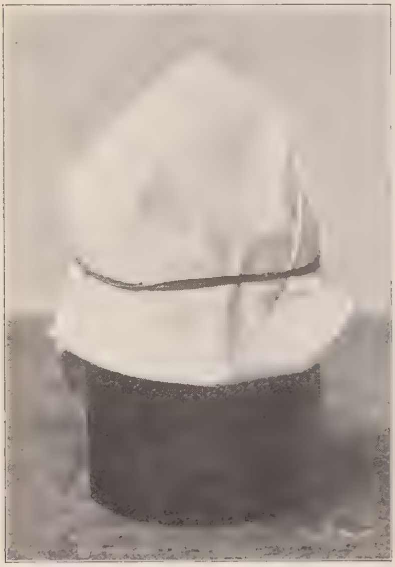


Fig. 1.

Ice Can Containing Sample Tubes, Protected by Rubber Cloth Cover.

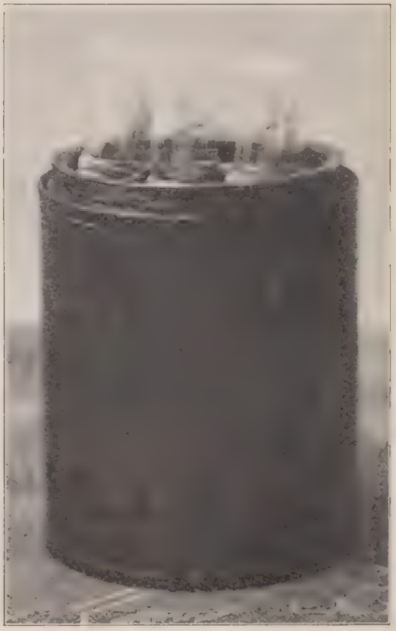


Fig. 2.

Ice Can with Sample Tubes in Position, Showing Rubber Band Collar about Each Tube.

The can, which is used as an ice receptable, is a Karo syrup can of one pint capacity with a depressed cover in which are punched a suitable number of holes a little larger in diameter than that of the test tubes used for collecting samples. The can and cover are given a coat of rust proof paint, both inside and out. For this purpose a preparation known as Harrison Brothers' Antoxide was found to be preferable to the ordinary brands of asphaltum paint.

For the sampling tube a four inch test tube is used, about which is placed a rubber band collar to prevent the tube from dropping through the opening. The necessity of the rubber band collar may be obviated by using a test tube a trifle longer than the height of the can.

A rubber cloth cover is placed over the can filled with test tubes, as shown in the illustration, to protect the cotton plugs from contamination. A rubber band is snapped about the cover to hold it in place.

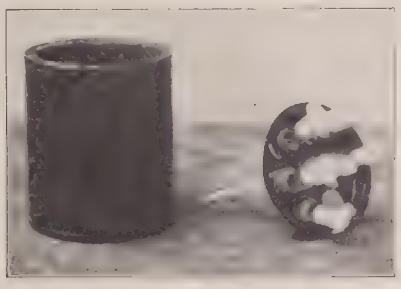


Fig. 3.
Ice Can Showing Perforated Cover with Sample Tubes Inserted.

The pipette can is made of stove-pipe iron with folded seams, unsoldered. It is twelve inches long and has a cap three inches long fitting snugly over the open end. It can be made by a tinsmith at a cost of about forty cents. It is protected from rust by a coat of black fire-proof paint. Some difficulty was experienced in finding a suitable paint for this purpose, as many so-called fire-proof paints burn off at the first sterilization. A brand known as Carbonall, however, was found to be fairly satisfactory although a coat must be renewed at intervals of about six to eight weeks.

The pipettes are made in the laboratory from one-half inch soft glass tubing drawn to a point at one end. The opposite end is plugged with cotton.

Fig. 4.
Pipette Can, Glass Pipettes and Alcohol Lamp.

The alcohol lamp is a flat type sold for heating hair curling irons. It may be obtained at any of the Department Stores at a cost of about twenty cents. A small awl is furnished for removing caps from the milk bottles.

A set of instructions is issued to each inspector who receives an outfit. He is directed to shake the milk bottle thoroughly, burn the lip of the bottle and the outside of the cap in the flame, sterilize the awl in the flame, remove the cap, collect the sample and place it in the can surrounded by cracked ice. The sample should be delivered to the laboratory not more than three hours from the time of collection.

REPORT OF THE COMMITTEE ON ORGANIZATION AND FUNCTIONS OF MUNICIPAL HEALTH DEPARTMENTS

Read before the American Public Health Association, Havana, Cuba, December, 1911.

To the American Public Health Association:

Your Committee mailed a questionnaire on the Organization and Functions of Municipal Health Departments to the Health Officers of all cities in the United States, Mexico, Canada and Cuba having a population of 25,000 or over, and received replies from eighty-eight cities.

Criticism as to the weakness of system, unsatisfactory conditions of municipal organization and suggestions founded on practical experience, for the improvement of existing evils, are treated in confidence. While general use is made of this information, names of officers and cities are not used in the report.

The population of the various cities ranges from 26,937 (Sague La Grande, Cuba) to 4,776,883 (New York City, N. Y.). Of these, 21 have a population of from 25,000 to 50,000; 25 of from 50,000 to 100,000; 20 of from 100,000 to 250,000; 7 of from 250,000 to 500,000, and 5 over 500,000.

The title of the executive officer of a health department is not of great importance, but in the majority of cities recorded in the questionnaire it is termed "Health Officer" (45) and "Commissioner of Health" (10). His appointment is by the Board of Health in 36 cities; by the Mayor in 10; by the Mayor confirmed by Councils in 8; by Councils in 6, and by the President in 2.

The tenure of office is by pleasure of the appointing power in 15 cities; no definite time in 2; during good behavior and satisfactory service in 4; one year in 10; two years in 16; three years in 5; five years in 3 and permanent in one. The salaries are from nothing to $10,000 per annum. In 2 cities the emoluments are received from fees; in 1 (Ft. Wayne Ind.) the officer is paid two cents per capita of population. In 36 cities the

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[1] The Chairman of your Committee is not absolutely fixed in his own mind that the conclusions reached in this report are sound and, therefore, does not ask the approval of the Association. The report is presented to bring up the entire subject in a tangible manner for discussion and recommittal to a committee for further consideration and report on the technique and methods of operating as well as organization.

[2] Replies were received from New York City, N. Y., Detroit, Mich., Elizabeth, N. J., and Erie, Pa., after the completion of the compilation on which this report is based. The Bureau of Municipal Research of Philadelphia made a statistical tabulation of all the information received from the cities which answered the questionnaire. The Committee hereby makes due acknowledgement for the efficient aid of the Bureau and regret that the size of this study makes it impossible to print here.

entire time of the occupant is required for the performance of his duties; in 42 only part of the time.

He is directly responsible in 45 cities to the Board of Health; in 9 to the Mayor, and in others to various public officers and legislative bodies.

In the event of the health officer being under control of the Board of Health, he is a member of such Board in 15 cities, in 8 of which he is the executive officer, and in 45 cities he is not a member.

Where he is not a member of the Board of Health, his relation to that Board is of an executive character in 25 cities; of an advisory capacity in 2 cities. In 17 cities there is no Board of Health.

The members of the various Boards of Health number from one to sixty; the latter being in Montgomery, Ala., where the members of the County Medical Society constitute the Board. Five members seems to be the popular number in 27 cities. In 16 cities there are three members and in 7 cities, seven.

The Board of Health is appointed by the Mayor in 26 cities; by the legislative body in 12; by the Mayor confirmed by the legislative bodies in 8, by the Governor in 1, and elected by the people in 1.

The tenure of office of members of the Board is from one to seven years; the majority (36) being from three to five years.

In 42 cities the members serve without compensation and in 15 they are paid in various ways. In a number a fixed figure is paid per meeting, which averages about $3. Where salaries are paid they run from $100 to $500 per annum. In some cities the executive officer only is paid, while in others the lay members receive compensation, but not the physicians.

In 35 cities ordinances provide that the members shall be medical men; in 25 there is no such provision; in 8 at least one member must be a physician; in 7 at least two, and in 5 at least three must be physicians.

In answer to the question: "To what extent is the Board of Health active in executive duties?" there are twenty-four different characters of answers, the majority of which are negative. In a number no general interest is taken; in others their action is chiefly advisory, and what executive work is done as a rule, is performed by other officers who mostly class as "Health Officers" and "Sanitary Commissioners."

In 2 cities the Board meets daily; in 8, weekly; in 14, bi-monthly, and in 26, monthly. In several cities no meetings are held and in others only when called by the proper officers.

The Board is responsible to the Mayor in 14 cities; in 14 to the legislative branch of the government; in 7 they appear to have no responsibility; in 16 are responsible to the State Board, and in other cities the responsibility is divided.

In 39 cities the Board has authority to adopt a sanitary code which has the force of law; in 21 no such power exists, and in 1 city the power is divided.

In 40 cities Councils or the legislative body, have a Committee on Health, which in most instances is perfunctory; in 34 cities no such committee exists.

In 14 cities this committee has no relationship at all with the Board of Health. In the majority of replies no answer has been made to this question.

Under these circumstances it is not surprising to find that in 32 cities the arrangement, where such committees exist, does not tend to confusion of authority. In 2 cities there is continual strife between the committee and health authorities, causing inefficiency of service.

In connection with the scope and limitation of the Health Department in most cities the registration of births, deaths and contagious diseases are entirely controlled by the Health Officer; marriages and divorces are included in but few cities; in 2, marriages are recorded, but in the majority of cases this record is kept by the City Clerk, the County Clerk, the Courts, and in 1 city by the Supreme Court. The record of divorces is kept, as a rule, by the City or County clerks, by the Courts and, in one case, by the Supreme Court. In some cities the registration of births comes under the State authorities: the State Board of Health or the State Registrar of Vital Statistics. With but few exceptions, where reports are made to the State Registrar of Vital Statistics or the State Board of Health, the registration of deaths comes directly under the municipal health department.

The control of contagious diseases comes under the municipal health department in 72 cities, and the abatement of nuisances in 77 cities. In the other cities the Board of Public Works, Sanitary Officer or Police control abatement of nuisances.

Street cleaning is under the municipal health department in but one city (Louisville, Ky.). In many of the cities (23) it comes under the Department of Public Works, while in others it is under the "Director of Service," Engineering Department, Highway Department, Sanitary Department, and various street cleaning departments under different titles. In some few cities there is a special officer with the title of Street Commissioner.

The removal of dead animals is under control of the health authorities in 48 cities; in others this comes under various public officials, Department of Public Works, Street and Highway Department, Dog Catcher, Street Sewer and Drain Department, etc.

Waste collection and disposal is handled by the health authorities in 28 cities and by the Department of Works in 11 cities.

Plumbing inspection is under the health department in 49 cities; there is no such inspection in 4, and in 10 others this is cared for by building departments under various titles.

A bacteriological laboratory for diagnosis, research work, manufacture of antitoxins and vaccines, and milk examinations is cared for by the health department in 25 cities; in many others there is no such laboratory, and in a number part of the work only is done.

In 70 cities provision is made for milk inspection.

Inspection of food supplies is covered in 67 cities by the municipal health department, and in 5 by the State.

Inspection of dairy farms is made by the municipal health authorities in 74 cities.

A chemical laboratory for analysis of milk, food supplies and drugs is provided for in 45 cities by the health department, while in 3 this comes under the State.

Medical inspection of schools and school children is covered by the health department in 40 cities and by the Board of Education or School Board in 27 cities.

Public vaccinations come under the Board of Education in 3 cities; charity department in 3; health department in 65 and none are required in 6.

Tuberculosis: — registration, sputum examinations and fumigation — is cared for in 59 cities by the municipal health department and in 3 by the State department. Three cities cover registration and fumigation and not sputum examinations; 1 covers fumigation but not registration and sputum examinations, and 3 cover registration and fumigation, but not sputum examinations.

There are very few cities having the same rules in connection with this subject. In many replies the question is not answered as to whether the following tuberculosis institutions are under the health department:

a. dispensaries.
b. day or night camps.
c.sanatoria for incipient cases.
d. hospitals for advanced cases.
6 cities reply in the negative to all.
4 " " "yes" to a, c and d.
3 " " " " a and b.
2 " " " " d.

Families of the tuberculous are given assistance in 17 cities by the Department of Charitiees, and in other cities through private agencies under various titles.

General fumigation for contagious diseases is conducted by the health department in 78 cities; in 1 soap and water cleansing is used; in another fumigation is not required, and the question is not answered by the other cities.

Free medical attendance on the indigent sick is provided in 77 cities, in 22 of which it is under control of the health department. In 2 cities assistance is rendered by the health department in cases of contagious diseases only; and in the balance of cities this activity is under control of various departments, viz.: the Department of Charities under various titles in 13 cities, City Councils, County Boards, County Directors, Physicians and State Boards.

District nurses are employed by the health department in 18 cities; in 7 they are under municipal charity boards; in 22 under various private and organized charities, and in 3 under State control.

Public education in hygiene, and sanitation, is under the health department in 10 cities, and under various other activities in a number of cities. A great variety of means are employed, the most common of which are lectures, leaflets, bulletins, newspaper publicity, moving pictures (in 3 cities), and public schools (in 5 cities).

Tenement house inspection is conducted under the health authorities in 58 cities; by building inspectors in 2, and by State authorities in 2.

Inspection of lodging houses is conducted by the health department in 15 cities (only 5 of which are in the United States); by the health department in conjunction with the police department in 2, and in 12 by other departments, such as Councils, State Tenement House Commission, etc.

Inspection of general housing conditions is conducted by the health department in 59 cities, and in 13 cities comes under building inspectors and private agencies.

Child Hygiene is under the control of the department of health in 26 cities; under the Board of Education in 4 cities, and under private organizations in 7 cities.

The work of the health department is done under city ordinances, sanitary code enacted by the Board of Health and State laws; under a combination of these in 49 cities; under city ordinances and State laws in 20 cities; and under sanitary code and State laws in 5 cities.

All practicing physicians are required to register with the Board of Health in 35 cities and in 40 no such registration is required.

Requirements for registration vary materially: 2 cities require filing of diploma with the Court or License Clerk; 5, the filing of diploma with the health authorities; 2, registration at county seat; 2, merely filing name and address; 8, filing of State license, and 9, certificate from State Board of Medical Examiners. Where physicians are not required to register with the health authorities they register with the State Board in 5 cities, and in 9 with various county officers.

Physicians are required to report all births to the health authorities in 59 cities; in 20 to city or county clerks, and in 10 no report is required. The time limit allowed for report is, as follows:

In 4 cities within 24 hours.
2 " " 36 "
3 " " 3 days.
9 " " 5 "
21 " " 10 "
1 " " 15 "
2 " " 30 "
1 " " the calendar month.
1 " " 2 months.
2 " before the first day of the succeeding month.
4 " within the fifth day of the following month.
1 " " " seventh" " "
6 " there is no time limit.

Physicians are required to report all deaths to the health authorities in 55 cities; in 1, only deaths from contagious diseases; in 2, report must be made to the city clerk, and in 13 there are no requirements. In 35 cities there is a time limit for reporting, as follows:

In 3 cities at once.
1 " within 2 hours.
1 " " 6 "
13 " " 24 "
2 " " 36 "
3 " " 2 days.
1 " " 3 days.
1 " " 5 "
2 " " 10 "
1 " " 30 "
6 " before burial.
1 " " the seventh of the succeeding month.

Most cities require reporting of some communicable disease, varying from one (smallpox), in 1 city to thirty-nine. Time allowed for making report is:

In 1 city, as soon as possible.
2 cities at once.
4 " within 6 hours
10 " " 12 "
24 " " 13 "
1 " " 14 "
1 " " 36 "
2 " " 1 week.

Forty-three cities require physicians to report recovery from reportable diseases; 1 city requires report in diphtheria and scarlet fever only, although all communicable diseases are reportable, and 1 city makes requirement in diphtheria only, although there are eight diseases specified as reportable.

There are a variety of measures employed for detecting unreported births, deaths, contagious diseases and recoveries from contagious diseases. In 26 cities no effort is made to check any of these reports; in 8, upon receipt of death notices, a search of the birth records is made to ascertain if birth has been reported; 2 use the baptismal records in churrces; 2 make a house-to-house canvass; 2 employ school nurses and examine church records; 1 has a regular "baby census" taken by the City Clerk, and in 1 monthly visits are paid to the physician. In cities where deaths are reported, 9 have no checks for detection of failure to report; in 15, burials or removals cannot occur without permit from the Board of Health; in 3 the notices in the daily papers are scanned, and in single cities the police, nurses and medical inspectors are variously used. From many cities the replies to the question on this subject are unsatisfactory. To keep check on reports of contagious diseases the school medical inspectors are used in 7 cities; in 8, sanitary medical inspectors; in 11, a careful examination is made of the list of absentees from school; in 2, arrests are made for failure to report; in 3 rumors are investigated; in 1, tab is kept on the sale of antitoxin, and in 1, personal notes in the daily papers are watched. The necessity for using any check in reporting recoveries from contagious diseases is denied in 7 cities; in 5 it is necessary to have recoveries reported before the placard is taken down; in 6, cases of contagious diseases are followed up and checked by medical inspectors; in 2, sanitary inspectors keep a check on this; in 4, the attending physicians' reports are relied upon, and in single cities reports are made by nurses, the school physician, truant school officer and quarantine guard.

All births are reported in 3 cities:
95 per cent. in 2 cities.
90 " " 7 "
85 " " 1 "
80 " " 4 "
75 " " 1 "
60 " " 1 "
50 " " 1 "
fairly " 1 "
fully " 1 "
Indifferently " 1 "
All deaths are reported in 14 cities.
fully " 7 "
90 per cent. " 1 city.
All contagious diseases are reported in 3 cities.
95 per cent. " 3 "
90 " " 2 "
80 " " 1 city.
75 " " 2 cities.
fairly " 1 city.
fully " 3 cities.
Indifferently " 3 "

Diphtheria, typhoid fever and scarlet fever are well reported and the balance of contagious diseases:

poorly	" 1 city
fully	" 1 "
80 per cent.	" 2 cities; balance poor.
95 "	" 1 city; " "

In 1 city 90 per cent. of tuberculosis is reported; balance of contagious diseases, 70 per cent.

From the meager replies to the question in reference to the co-operation of physicians in reporting recoveries from contagious diseases it is to be judged that but little attention is paid to this important subject. Of the 7 cities replying in full, the answers are from "fair" to 90 per cent. of recoveries reported. The remaining answers to this series of questions cannot be used for statistical purposes, due possibly to the misunderstanding of the question, as the replies for the most part are unintelligible.

The question was asked whether the most efficacious method of securing full reports from physicians was (a) by persuasive measures, including personal appeals in cases of actual delinquents, or (b) universal reporting of delinquents to court and the imposing of a stipulated fine. Fifty-six cities replied in favor of the former; 6 in favor of the latter; 5 believed that the former method should be used, with an occasional prosecution; 5 in the combination of both methods. This question was not answered in a number of cases and in some few the answer was unsatisfactory.

Most cities reported good co-operation of the medical profession with the municipal health department, both in the regular routine backing-up of the department among their patients and in active support under emergency conditions. In replies to this question from 36 cities the following terms are used: "Hearty, full, complete, excellent, very good co-operation of the profession at all times." A few cities report on the percentage of the profession that co-operate. In 1 city there is 95 per cent. in 1, 80 per cent., and in 2, 75 per cent. of the medical profession that co-operate with the health authorities. Six cities use the term "generally" and in a majority of instances, "co-operate." In 1 city there is a fair co-operation at times, but excellent at times of emergency; 3 cities report "fair co-operation"; 1 city, "some interest"; in 1 city the interest is variable; in 4 there is but very little interest taken, and in 2 decided antipathy by the profession to the department.

There are very few health departments that have any systematic means of keeping the physicians actively in touch with the authorities, in acquainting them with general and special health conditions. Ten cities issue bulletins; 2, weekly; 4, monthly, and the balance not stated. Four cities issue special circulars as occasion requires; 5 issue circular letters when anything of importance arises; in 3 cities the medical profession is kept in touch with the work by personal attendance of the health officer at meetings of the medical societies; in 19 reports of vital statistics are issued at periods, varying from a month to a year; the daily press is used in 5 cities and no means of securing this necessary aid is employed in 11 cities.

The proper organization of a health department depends largely upon the size, location and activities of a city. Modifications must be made in accordance therewith; for example, in residential cities inspections in connection with manufactories would not be needed; in cities where the tenement house problem does not exist, no tenement house inspection would be required; and there are some subjects incorporated herein that many believe should not be chargeable to a health department, such as plumbing inspection and collection of garbage. But in the following organization plan attempt will be made to cover everything, as the elimination of the unnecessary can be made as required. For example: a scheme for a city of 500,000 population is mapped out, allowing roughly a 20 per cent. increase in the number of employees and 10 per cent. increase in salaries for every 100,000 population over 500,000 and up to 1,000,000 (when the limit of increase of most salaries is reached and the ratio of increase of employees diminishes) and, in a similar manner, a 20 per cent. decrease number of employees and 10 per cent. decrease in salaries for every 100,000 population under 500,000.

The Mayor should be *ex-officio* a member of the Board of Health.

The Board of Health should consist of the health commissioner, head of the department of public safety, head of the department of public works, and two others to be appointed by the Mayor with or without the endorsement of the legislative body of the city government, one of whom should be a sanitary engineer and one a lawyer. The Board should serve without salary. The functions of the Board should be purely legislative and advisory. It should be clothed with power to enact laws in relation to the public health and declare nuisances prejudicial to the public health. These arbitrary powers are too great to invest in any one man. The Board should also have the appointment of its secretary and of the health commissioner.

The co-operation of the police is necessary for the effective administration of a health department as, without this, quarantine cannot be maintained and laws cannot be enforced. In most American cities the police are organized for repression of violence and protection of life and property. With the head of the department a member of the Board of Health the police can be organized to repress disease and preserve health. They intimately know the highways and byways and could report nuisances of all kind; they could keep track of the ash can, garbage can, waste paper and rubbish — become, in fact, sanitary inspectors without adding much to their labors and be an important factor in economy of municipal administration.

The head of the Department of Public Works should be a valuable man with his knowledge of sewer construction, sewage disposal, the water problem, opening of streets, the survey of the city in its relation to grades, surface drainage, etc.

These officials, if interested, could throw the influence of their departments in aid of the Health Department and accomplish results not otherwise obtainable.

The Board should have a secretary at a salary of $1,000 per annum.

The Commissioner of Health should receive a salary of $5,000 per annum and be under the control of the Board of Health only in so far as pertains to the execution of the laws enacted by them, but he should be under their influence as acting in an advisory capacity. The commissioner should be the supreme executive of the Municipal Department of Health. His appointment should be permanent and influenced by efficiency and not politics. Inefficiency or malfeasance in office should be the only cause for discharge. The power of discharge should lie with the Board subject to an appeal by the Commissioner to a Court of Record, provided such appeal be taken within ten days.

The various bureaus should each have a chief, at an average salary of $2,000, who should be the executive head of the bureau, reporting only to the health commissioner.

1. BUREAU OF MEDICAL INSPECTION:

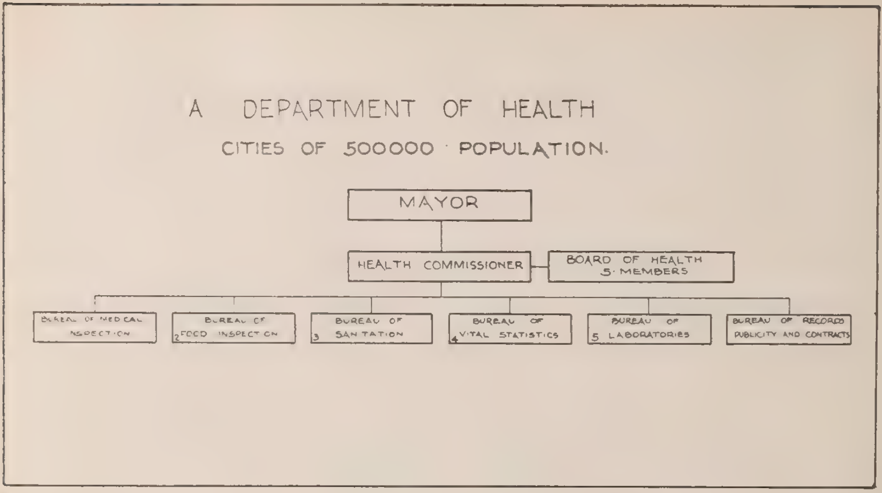
The chief of this bureau should have a clerk at $800 and a stenographer at $650. The bureau should control the following divisions:

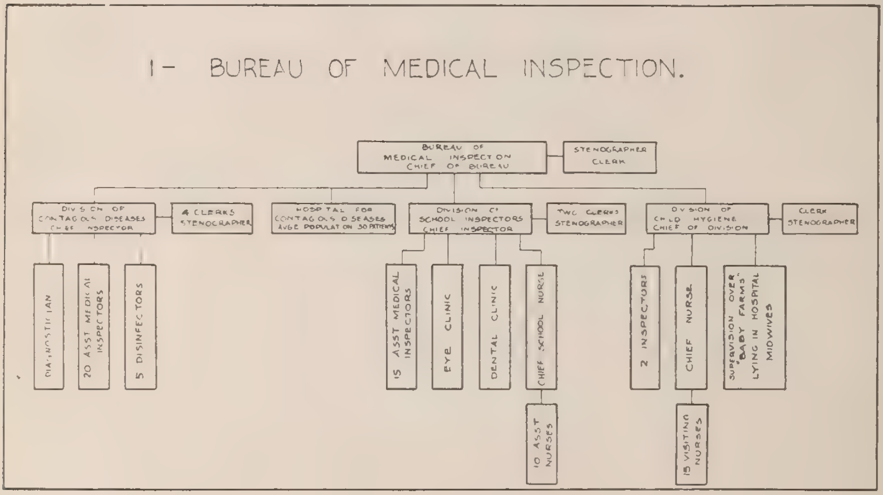
a. Inspection of Contagious Diseases.
b. Hospital for Contagious Diseases.
c. School Inspection.
d. Child Hygiene.

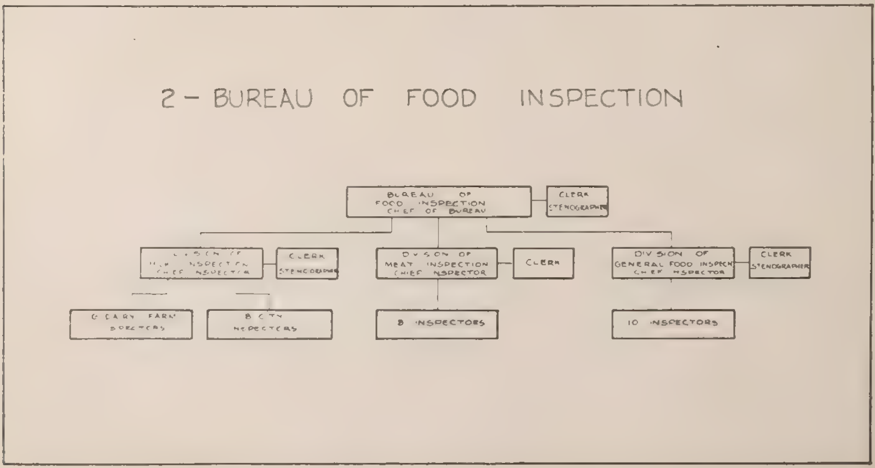
(a) Division of Inspection of contagious diseases should have two clerks at $800 and one stenograpner at $650; a chief inspector at $1,800; 10 assistant inspectors at $1,200; 1 expert diagnostician, paid by fees which, for calculation, would amount to $800 per annum, and 5 disinfectors at $1,000.

(b) A hospital for contagious diseases (excepting tuberculosis) should be maintained as the best means of preventing the spread of contagion by the prompt removal from the homes in the slum districts of those suffering from contagious diseases. Such an institution, accommodating on an average of 50 patients per day with maintenance of $1.30 per diem, would cost $23,725 per annum.

In most cities advanced tuberculosis is cared for in the City Poor Hos-


A DEPARTMENT OF HEALTH
CITIES OF 500000 POPULATION.
MAYOR
HEALTH COMMISSIONER
BOARD OF HEALTH 5 MEMBERS
BUREAU OF MEDICAL INSPECTION
2 BUREAU OF FOOD INSPECTION
3 BUREAU OF SANITATION
4 BUREAU OF VITAL STATISTICS
5 BUREAU OF LABORATORIES
BUREAU OF RECORDS PUBLICITY AND CONTRACTS


1 – BUREAU OF MEDICAL INSPECTION.
BUREAU OF MEDICAL INSPECTION CHIEF OF BUREAU
STENOGRAPHER CLERK
DIVISION OF CONTAGIOUS DISEASES CHIEF INSPECTOR
4 CLERKS STENOGRAPHER
HOSPITAL FOR CONTAGIOUS DISEASES AVGE POPULATION 30 PATIENTS
DIVISION OF SCHOOL INSPECTORS CHIEF INSPECTOR
TWO CLERKS STENOGRAPHER
DIVISION OF CHILD HYGIENE CHIEF OF DIVISION
CLERK STENOGRAPHER
DIAGNOSTICIAN
20 ASST MEDICAL INSPECTORS
5 DISINFECTORS
15 ASST MEDICAL INSPECTORS
EYE CLINIC
DENTAL CLINIC
CHIEF SCHOOL NURSE
10 ASST NURSES
2 INSPECTORS
CHIEF NURSE
15 VISITING NURSES
SUPERVISION OVER "BABY FARMS" LYING IN HOSPITAL MIDWIVES


2 – BUREAU OF FOOD INSPECTION
BUREAU OF FOOD INSPECTION CHIEF OF BUREAU
CLERK STENOGRAPHER
DIVISION OF MILK INSPECTION CHIEF INSPECTOR
CLERK STENOGRAPHER
DIVISION OF MEAT INSPECTION CHIEF INSPECTOR
CLERK
DIVISION OF GENERAL FOOD INSPECTION CHIEF INSPECTOR
CLERK STENOGRAPHER
6 DAIRY FARM INSPECTORS
8 CITY INSPECTORS
8 INSPECTORS
10 INSPECTORS

pital by the Department of Charities, and incipient cases by private charities. In an ideal organization the Health Department should super intend all activities for the study, prevention and treatment of tuberculosis through its division of contagious diseases, day camps, dispensaries, sanitoria and, most important of all, institutions for segregation of advanced cases.

(c) Division of School Inspection should have one chief inspector at $1,800. He should instruct school teachers in the proper methods of teaching social, sex and personal hygiene, and supervise 15 assistant inspectors at $900; a dental dispensary, $2,000; an eye dispensary, $2,500; chief school nurse, $1,000; 20 assistant nurses at $700; 2 clerks at $800 and 1 stenographer at $650.

(d) Division of Child Hygiene: Chief of the division, $1,800; 2 clerks at $800; 1 stenographer at $650; 1 inspector at $1,000; chief municipal nurse at $1,000; 15 visiting nurses at $700. This division should provide for examination, licensure and control of midwives, "baby farms" and so-called "lying-in" establishments, as well as for milk stations and all special endeavors for children; and should co-operate with private associations.

2 — BUREAU OF FOOD INSPECTION:

This bureau should have a clerk at $800, a stenographer at $650 and the following divisions:

a. Milk Inspection.
b. Meat (Fish and Fowl) Inspection.
c. General Food Inspection.

(a) Division of milk inspection: This division should have a chief at a salary of $1,800; 6 dairy farm inspectors at $1,000; 8 city inspectors at $900, for examination of pasteurizing plants and of milk on the platform, in the wagons and in the stores; and 1 clerk at $800.

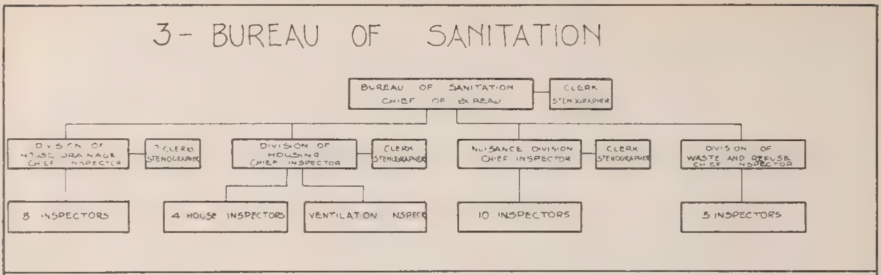
(b) Division of Meat Inspection should have a chief — preferably a veterinary physician — at $1,800; 4 inspectors (veterinarians) at $1,400; 4 inspectors (lay) at $1,000, and 1 clerk at $800.

(c) Division of General Food Inspection should have a chief at $1,800; 5 assistant inspectors at $900; a clerk at $800, and a stenographer at $650. The duty of this Division is to inspect all places where food may be prepared — bakeries, restaurants, hotels and cold storage plants, and inspect the transportation of food and food exposed for sale.

3 — BUREAU OF SANITATION:

The chief of this bureau should be preferably a sanitary engineer. The bureau should have a clerk at $800, a stenographer at $650 and the following divisions:

a. House Drainage.
b. Housing.
c. Nuisances.
d. Wastes and Refuse.


3- BUREAU OF SANITATION
BUREAU OF SANITATION CHIEF OF BUREAU
CLERK STENOGRAPHER
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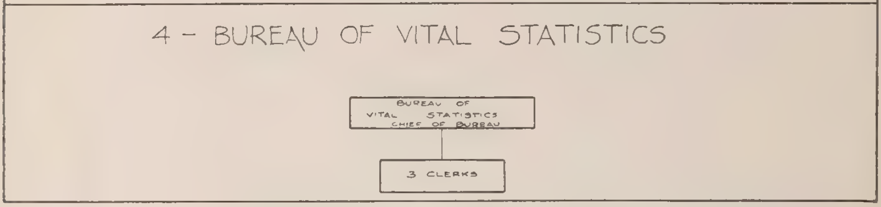
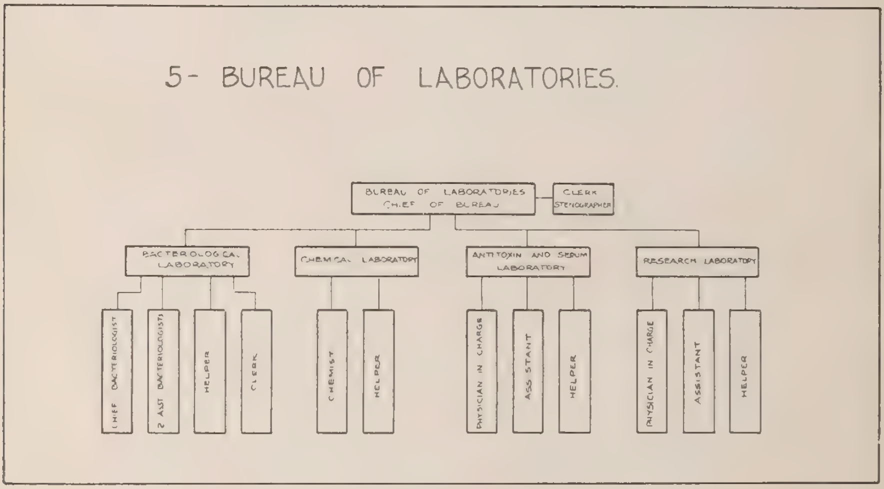
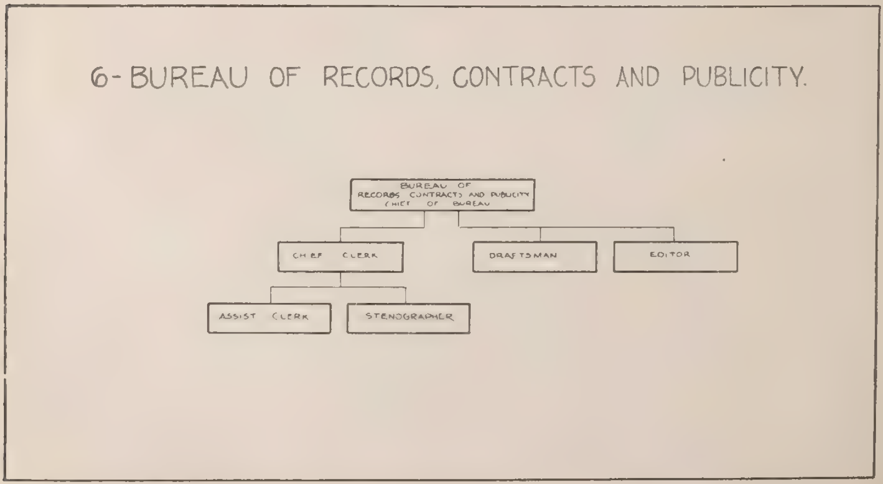
DIVISION OF HOUSING CHIEF INSPECTOR
CLERK STENOGRAPHER
NUISANCE DIVISION CHIEF INSPECTOR
CLERK STENOGRAPHER
DIVISION OF WASTE AND REFUSE CHIEF INSPECTOR
8 INSPECTORS
4 HOUSE INSPECTORS
VENTILATION INSPEC
10 INSPECTORS
5 INSPECTORS


4 - BUREAU OF VITAL STATISTICS
BUREAU OF VITAL STATISTICS CHIEF OF BUREAU
3 CLERKS


5- BUREAU OF LABORATORIES.
BUREAU OF LABORATORIES CHIEF OF BUREAU
CLERK STENOGRAPHER
BACTERIOLOGICAL LABORATORY
CHEMICAL LABORATORY
ANTITOXIN AND SERUM LABORATORY
RESEARCH LABORATORY
CHIEF BACTERIOLOGIST
2 ASST BACTERIOLOGISTS
HELPER
CLERK
CHEMIST
HELPER
PHYSICIAN IN CHARGE
ASSISTANT
HELPER
PHYSICIAN IN CHARGE
ASSISTANT
HELPER


6- BUREAU OF RECORDS, CONTRACTS AND PUBLICITY.
BUREAU OF RECORDS CONTRACTS AND PUBLICITY CHIEF OF BUREAU
CHIEF CLERK
DRAFTSMAN
EDITOR
ASSIST CLERK
STENOGRAPHER

(a) Division of House Drainage should have a chief at $1,500; 1 clerk at $800; clerk and stenographer at $800, and 5 inspectors at $1,000.

(b) Division of Housing should have a chief at $1,800; 4 tenement and lodging house inspectors at $900; 1 special inspector of ventilation to examine all public and semi-public buildings at $1,200; 1 clerk at $800 and a stenographer at $650.

(c) Division of Nuisances should have a chief at $1,800; 9 inspectors of Nuisances, including those of offensive trades, stables and housing of animals at $900; 1 smoke inspector at $900; 1 clerk at $800 and a stenographer at $650.

(d) Division of Wastes and Refuse should have a chief at $1,500 and 3 inspectors at $900.

4 — Bureau of Vital Statistics:

The chief of this bureau should not only keep an accurate record of deaths, births, marriages, registration of physicians and midwives, but compile statistics for the bureau of records and contracts. He should have a salary of $1,500 and 3 clerks at $800.

5 — Bureau of Laboratories:

The chief of this bureau should be preferably a bacteriologist and receive a salary of $2,000 per annum. This bureau should include the following:

Chief Bacteriologist	$1,500
Assistant Bacteriologist	1,000
Helper	600
Clerk	800
Chief Chemist	1,200
Helper	600
Physician in charge of Antitoxin and Serum Laboratory	1,500
Assistant	1,000
Helper	600
Hostler	600
Physician in charge of Research Laboratory	1,200
Assistant	1,000
Helper	600

The Chemical, Antitoxin and Serum, and Research laboratories may be eliminated from cities of 500,000 population as an economic problem, as examinations made in the first-named and the products of the second named laboratories may be purchased for less money than the maintenance cost of the laboratories; and research work may be carried on in institutions other than municipal. For cities of 1,000,000 and over there is no question that the municipal laboratories are more economical.

6 — Bureau of Records, Contracts and Publicity.

The chief of this bureau should receive $2,000. He should personally conduct all publicity; edit a weekly bulletin and all circulars for educational purposes; compile all statistics of the department; be responsible for all records and contracts and take care of all accounts of the different bureaus. The bureau should have a chief clerk at $1,200; a draftsman at $1,000 to chart and prepare data for benefit of the public: a clerk at $800 and a stenographer at $650.

Total cost as enumerated, 41 cents per capita of population	$204,975
Allowing $5,000 for postage, printing and incidentals, the cost would be 42 cents per capita	233,175
Allowing $17,000 for new equipment and supplies the cost would be 45 cents per capita	250,000

a cheap investment for any community, for, with such organization, efficiently handled, the returns in improved health, less suffering, lowered mortality, increased vigor and general civic uplift would be impossible to figure in dollars and cents.

In organizations for cities under 100,000 population similar units will avail. For example: In cities, say of 25,000 inhabitants, the allowance would be at 45 cents per capita, $11,250. This amount, although small in comparison, will accomplish the same results as the larger sum in larger cities. Here the various bureaus and divisions are dropped; the medical inspector would be a practitioner of medicine and devote to municipal work but a few hours a day; 1 inspector would cover general sanitation and nuisances of all kinds; 1 would cover milk, meat and all foodstuffs; 1 clerk would attend to the entire division of vital statistics; laboratory examinations would be made in a hospital; and the health commissioner, devoting his entire time to his official duties, should take over the duties of the several bureau chiefs; edit all educational leaflets, compile statistics and prepare all data for public information, etc. This small, but thoroughly efficient force could be secured for $11,250 per annum — a 45 cent per capita.

Jos. S. Neff, *Chairman*

Dr. J. H. Landis, a member of the Committee, submitted the following statement to the Chairman· "I have gone over your plan of organization of Municipal Health Departments and agree heartily with all but the organization of the Board. While the presence of the directors of Public Safety and Service on this Board would theoretically be desirable, I believe that a non-partisan Board will secure better results."

APPENDIX.

Commissioner of Health		$5,000
Secretary, Board of Health		1,000

Bureau of Medical Inspection.

Chief	$2,000	
Clerk	800	
Stenographer	650	
		$3,450

(a) *Division of Contagious Diseases.*

Chief	$1,800	
2 clerks at $800	1,600	
1 stenographer	650	
10 assistant medical inspectors at $1,200	12,000	
Diagnostician	800	
5 disinfectors at $1,000	5,000	
Hospital (50 patients)	23,725	
		$45,575

(b) *Division of Medical School Inspection.*

Chief	$1,800	
2 clerks at $800	650	
Stenographer	650	
15 assistant medical inspectors at $900	$13,500	
Dental dispensary	2,000	
Eye dispensary	2,500	
Supervising school nurse	1,000	
20 nurses at $700	14,000	
		$37,050

(c) *Division of Child Hygiene.*

Chief	$1,800		
2 clerks at $800	1,600		
Stenographer	650		
Inspector	1,000		
Supervising visiting nurse	1,000		
15 nurses at $700	10,500		
		$16,550	
			$102,625

Bureau of Food Inspection.

Chief	$2,000	
Clerk	800	
Stenographer	650	
		$3,450

(a) *Division of Milk Inspection.*

Chief	$1,800	
Clerk and stenographer	800	
6 dairy farm inspectors at $1,000	6,000	
8 city inspectors at $900	7,200	
		$15,800

(b) *Division of Meat Inspection.*

Chief	$1,800	
Clerk	800	
4 veterinary inspectors at $1,400	5,600	
4 veterinary inspectors at $1,000	4,000	
		$12,200

(c) *Division of General Food Inspection.*			
Chief	$1,800		
Clerk	800		
Stenographer	650		
5 inspectors at $900	4,500		
		$7,750	
			$39,200
Bureau of Sanitation.			
Chief	2,000		
Clerk	800		
Stenographer	650		
		$3,450	
(a) *Division of House Drainage.*			
Chief	$1,500		
Clerk	800		
Clerk and stenographer	800		
5 inspectors at $1,000	5,000		
		$8,100	
(b) *Division of Nuisance Inspection.*			
Chief	$1,800		
Clerk	800		
Stenographer	650		
10 inspectors at $900	9,000		
		$12,250	
(c) *Division of Housing Inspection.*			
Chief	$1,800		
Clerk	800		
Stenographer	650		
4 tenement and lodging house inspectors at $900	3,600		
1 inspector of ventilation	1,200		
		$8,050	
(d) *Division of Refuse and Waste.*			
Chief	$1,500		
Clerk and stenographer	800		
3 inspectors at $900	2,700		
		$5,000	
			$36,850
Bureau of Vital Statistics.			
Chief	$2,000		
3 clerks at $800	2,400		
		$4,400	
			$4,400
Bureau of Laboratories.			
Chief	$2,000		
Clerk	800		
Stenographer	650		
		$3,450	

Bacteriological Laboratory.			
Chief	$1,500		
Clerk	800		
Assistant	1,000		
Helper	600		
		$3,900	
Chemical Laboratory.			
Chief	$1,200		
Helper	600		
		$1,800	
Serum and Antitoxin Laboratories.			
Chief	$1,500		
Helper	600		
Hostler	600		
		$2,700	
Research Laboratory	$1,200		
Assistant	1,000		
Helper	600		
		$2,800	
			$14,650
Bureau of Records.			
Chief	$2,000		
Chief Clerk	1,200		
Draftsman	1,600		
Clerk	800		
Stenographer	650		
		$5,650	
			$5,650
			$209,375

RETIREMENT OF DR. SAMUEL H. DURGIN FROM THE BOSTON BOARD OF HEALTH

Extracts from an article by Mr. George A. Babbitt, Boston Herald, April 29, 1912.

Chairman Samuel H. Durgin of the Health Department appears to be scheduled for retirement under the veterans' pension act . . . If one were to judge from the personal appearance of Chairman Durgin, it would be difficult to conclude that he is now in his seventy-third year. His dapper figure, his spry and elastic step, his unwrinkled brow and his clear eye give him the aspect of middle age, rather than of more than threescore and ten. And yet it is recorded that he was born in Bucksport, Me., July 26, 1839. His advanced age is not so notable, however, as is the length of his service in the Boston City government. He was appointed port physician and resident physician at Deer Island as early as 1867, so his tenure as a municipal officer covers an unbroken period of forty-five years, forty of which he has been at the head of the Boston Health Department. He thus outranks all of our municipal officials in length of service.

In view of his prospective retirement, it is not premature to review Chairman Durgin's official career, and to estimate the value of his services to the city. In doing so, it is not necessary to lose sight of the fact that he has had his shortcomings, or that he has been subject to more or less reasonable criticism. In this respect he does not differ from about all our municipal officials nowadays, good, bad and indifferent, and it not infrequently happens that the greater the efficiency of the official the more frequent and vehement the criticism. Perhaps the most conspicuous of Chairman Durgin's shortcomings, if it may be called such, has been his exceeding modesty. During his long term of service he never acquired or practiced the somewhat prevalent and popular art of blowing his own trumpet, or of mounting the housetops to proclaim the achievements of the department over which he has presided. He has preferred to let results speak for themselves. He has not only failed to practice this blatant art, but he has abhorred it. It has been his notion that work for the protection of the public health should be done quietly, almost stealthily, in order to achieve the best results. If an epidemic of any kind was threatening, he has taken measures to check it without any unnecessary noise. Some of his most ardent critics, official and unofficial, have denounced this course on his part, maintaining that if the health of the people was in danger they ought to know it promptly and all together. It was Chairman Durgin's habit to remind these critics that next to the actual existence of a widespread epidemic the worst thing was public excitement and apprehension concerning it, and that this sort of agitation was not only unwarranted, as a rule, but that it wrought incalculable injury to the welfare of the city. And so it has happened that in a great majority of cases, threatened epidemics in Boston have been dealt with and averted without any public alarm. Thus the health department, under Chairman Durgin's direction, has been accomplishing good work which the general public knew nothing about.

Perhaps in none of the sciences has there been greater progress in the last quarter of a century than in that of public hygiene. During that time many and great discoveries have been made in the line of preventive medicine. Old theories and methods have been discarded and new ones have taken their places. There is a more or less popular impression that the old practitioners in all branches of medicine and sanitation have passed out with the old doctrines and appliances, and that in progressive communities the new order of things is or should be administered by representatives of the new school. No doubt this impression has operated somewhat to Chairman's Durgin's disadvantage. . . . Those who have watched him carefully and intelligently know that he has kept pace with the progress of his profession and that he has not allowed his reverence for the old moon to obscure his view of the new one. There has been no new departure in sanitary science that has not received his careful attention and been accorded the recognition to which its merits have entitled it. This has been particularly the case in bacteriological work, which is now recognized as one of the more essential features of an effective health department. Boston was the first city to undertake the medical inspection of pupils in the public schools. This scheme was first proposed and put in operation by the Boston Board of Health under Chairman Durgin's direction, and its benefits are attested by the fact that it has since been put in practice by all the cities of the country, as well as in most of the towns. Coincidently with his local work, Chairman Durgin has been an active and influential member of the leading state and national health organizations where questions relating to the protection and promotion of the public health are discussed, and he has shown himself in full accord with the progressive sentiment of these expert bodies.

Few public officials have possessed the confidence and support of their profession to the extent that Chairman Durgin has. He could always count upon the practically solid backing of his fellow doctors in his work and thay have never faltered in their cordial cooperation with him. It is no secret that not a few of the many mayors under whom he served have had it in mind to supersede him, but they have always thought better of it after hearing from the representative members of the medical profession who have stood behind him to a man. Doubtless this fact explains his survival of about all his contemporaries in municipal officialdom who one after another have succumbed to the frequent mutations of politics in city government, during his long term of service. The physicians of Boston have known and respected Chairman Durgin and they have made that fact effectively known.

To any one acquainted with the internal workings of commissions it is easily apparent that in order to secure the best results in such organizations there must be a recognized leadership. Without it there would be a lack of harmony that would be fatal to effective work. . . . Dr. Durgin has been distinguished for his tact, suavity and uniform courtesy and his relations with his associates have generally been so pleasant as to prevent anything like friction. As the official spokesman of the Board he has sustained equally pleasant relations with the general public. He has had to deal with all classes and conditions of people, with all kinds of grievances. Complainants of all varieties, politicians, faddists, cranks and others who deem it their duty or privilege to pester public officials have received from him all the consideration which was their due. Whenever he has been called to account for any alleged dereliction of duty he has responded freely and frankly to his critics and has generally had the better of the argument. More than one mayor of Boston has called upon him at the peril of losing his official head to do what he could not see his way clear to do, and more than once he has told the threatening mayor to proceed with the sacrifice, if that was the necessary alternative. The mayor has invariably retreated and the head of the Health Department has remained unmolested if not undisturbed.

The $2,500 pension on which Chairman Durgin will retire represents but an infinitely small fraction of the value of the benefits which he has rendered to the city in his official capacity. When he first came into office he found the city in the grip of a smallpox epidemic that had carried off hundreds of people. This was soon suppressed and since that time no preventable disease has reached epidemic proportions in Boston and the sanitary condition and general health of the city are now better than they ever have been. This is a record of which any retiring official has a right to be proud, and the city which he has so efficiently served may well rejoice to share in this satisfaction.

Having served for a period of 21 years as a colleague of Chairman Durgin on the Board of Health, I reckon myself qualified to testify thus fully and cordially as to his official record and achievements.

BOOK REVIEWS

Report upon Sewage Disposal for Pittsburgh, Pa.

Messrs. Hazen and Whipple, under date of January 30, 1912, have presented to Mr. N. S. Sprague, Superintendent of the Bureau of Construction of Pittsburgh, Pa., a plan and report for a comprehensive sewerage plant for the collection and disposal of all the sewage of the city. This report, together with a supplementary report by Messrs. Frederick P. Stearns and Harrison P. Eddy, who have examined the details of Hazen and Whipple's report and concur in their conclusions, and also with a letter of transmissal by Mr. Sprague discussing these reports, have recently been published.

Hazen and Whipple find after reviewing the various communications of the State Commissioner of Health that in order to conform with the requirements of the Commissioner it will be necessary to devise a method for the collection of the sewage from the whole city of Pittsburgh and for purifying it before discharging it into the river. Such purification is required solely from the standpoint of drinking waters taken from the river below. The Commissioner does not suggest that any other objects are to be attained or desired. It is pointed out that most of the large existing works have been constructed and operated solely with reference to the prevention of physical nuisances, such as the fouling of waters by deposits and the production of offensive odors. In the few cases where works have been built for the protection of water supplies they have been small and the cost of treatment has been borne by the municipality whose water supply was benefited. The present problem is, therefore, a novel one and without precedent.

The installation of sewage purification works of the type that have been installed by all of the larger American cities which have taken up this matter at all would fail to prevent the passage of infectious material and would, therefore, not accomplish the desired purpose. The present problem is taken up on a basis of considering only those methods which will be reasonably efficient and certain in stopping the discharge of infectious matter. The preliminary investigations involved laboratory studies of the chemical and biological nature of the sewage and of the river water covering a period of over a year; stream and sewer gaugings, and physical examination of the rivers by boat, supplemented by an extended inquiry of those whose business takes them frequently upon the river or near it, as to the condition of the water and the effect of pollution upon it.

In determining the size and cost of these works provision is made for the ultimate inclusion of a population of 1,900,000 people. This is three and a half times the present population of the city of Pittsburgh and is intended to include a considerable portion of the surrounding territory. The works as outlined and as considered essential for carrying out the requirements of the Commissioner of Health are:

1. A separate system of sewers throughout the city.
2. Intercepting sewers having a capacity of 300 gallons per capita for a population twice as great as that shown by the census of 1910.
3. A pumping station.
4. A complete system of purification works located on Neville Island.

Plans for these works have been developed sufficiently to afford a basis for making and estimating all cost of construction and of operation.

Provision for a separate system is to be made by using present sewers for drainage and storm water and building new domestic sewers. This involves changing of roof water drains, and a separate estimate of the cost of these changes has been made by the careful study of a selected region. In the same way estimates for the domestic sewers were made by selecting four typical areas and studying these in detail.

The intercepting sewer must be so deep that it is found most economical to put in considerable portions of it by deep rock tunneling.

The pumping station will have boilers of about 10,000 horse power and will lift the sewage 65 feet.

The sewage disposal works, as designed,

embody grit chambers, settling tanks, trickling filters, final settling tanks and in the latter hypochlorite disinfection will be carried out. The works follow closely, therefore, the Baltimore plans. Before the time comes to build such works, it is quite probable that there will be changes in the art that would render them obsolete.

Settling tanks will have a net capacity of three hours for the normal flow; the trickling filters are to be 6½ feet deep and one acre is to serve a population of 12,500 people. The final settling tanks have a two hours flow at average rate.

At time of high water the trickling filters and final settling tanks will be out of use, and it is intended to treat the sewage with hypochlorite alone. The possibility of entirely omitting the trickling filters is considered. In this case it is deemed necessary to increase the size of the settling tanks. Omitting the filters would result in the reduction of the first cost of works by about 6% or 7%. There would be no saving in the cost of operation as the additional quantity of hypochlorite of lime would offset the saving in the cost of operating the filters. This is based upon the view that the effluent from a sedimentation tank would require 125 pounds of hypochlorite per 1,000,000 gallons, while with untreated sewage double this quantity would be necessary.

After pointing out certain objections to the location of works on the Island the all-important question of cost is taken up. Estimates are made on two bases; first for the city of Pittsburgh only, and with provision for 800,000 population, except in the main and intercepting sewers, which are larger; second, for the whole Pittsburgh district, providing for 1,400,000 in the same way. In the first plan the total estimated cost is $37,300,000 and the annual cost of operation $435,000 which, capitalized at 5% and added to the first cost, gives a total cost of works of $46,000,000. Under the second plan the costs are: construction, $57,000,000; operation, $80,000 per annum; total, $73,100,000.

Acid iron wastes from the mines and spent pickle from the manufacturing establishments tend to modify the effects of sewage pollution in the river and to disinfect the polluted waters. For the present and for many years to come proper methods of treatment will yield satisfactorily good water from the Allegheny and Ohio rivers. The Monongahela has already reached such a state that it is difficult to treat it. Statistics of the cities and towns using the Ohio, below Pittsburgh, for water supply do not show that the water in its present condition cannot be made safe by filtration, just as the water of the Hudson, polluted by the sewage of Troy, Schenectady and other cities is purified at Albany, while with most efficient sewage disposal at Pittsburgh these waters would not be safe for drinking in their raw state. The cost of providing pure water for the entire population under consideration would be extremely small when compared with the cost of installing works for treating the sewage of Pittsburgh. Installing such water-works with proper management would insure a supply of safe water; purifying the sewage of Pittsburgh would make only a slight difference and would not be a material element of the water supply situation in the valley below.

The question of physical nuisance in the stream and particularly of local nuisances about the sewer outlets of the city is studied, and it is concluded that the ordinary flow of the river is more than sufficient to dilute the sewage of the probable future population for a considerable period of years to a point where it is inoffensive. At times of low water flows the acid waters become most efficient in their purifying action. The question of local nuisance is, therefore, a secondary one.

The final recommendations are in favor of the provision of additional sewerage for the Nine Mile Run and the Saw Mill Run districts; for the improvement of sewage outlets and the prevention of local nuisance and for improvements to provide against flooding of sewers in the low-lying regions. In regard to the disposal of the sewage it is recommended that for the present the method of sewage disposal be by dilution in the waters of the Allegheny, Monongahela and Ohio rivers. Dilution is a well-recognized method of disposal of sewage in general use throughout the civilized world. There is no occasion for the expenditure of many millions of dollars by the city at this time for radical changes in the works or in the methods of disposal.

Messrs. Stearns and Eddy in a brief report indicate that they have carefully considered the plans and estimates prepared by Hazen and Whipple; that they believe all of the features of the plans as set forth are necessary to an effort to protect the water supplies in question by the treatment of the sewage of Pittsburgh; that the execution of this plan will not accomplish the main purpose suggested in the permits of the Commissioner of Health; and that the advantages which would result are not enough greater chan the disadvantages to warrant the great tost involved in the construction and maintenance of the works. They, therefore, concur in the opinion expressed by Hazen and Whipple that the city is not justified in undertaking the project.

In his letter of transmissal, Mr. Sprague briefly summarizes these reports and their conclusions and fully concurs in them. The rivers are natural and logical drains formed for the purpose of carrying wastes to the sea. When the amount of such wastes produces a nuisance, it is then time to adopt remedial measure for its abatement. The requirements of the state are held to be unwarranted and would fail to accomplish their purpose.

Earle B. Phelps.

Mass. Inst. Tech.,
Boston, Mass.

A Manual of Practical Hygiene. For Students, Physicians and Health Officers, *by Charles Harrington, M.D., late Professor of Hygiene in the Medical School of Harvard University. Fourth edition, revised and enlarged by Mark W. Richardson, M.D., Secretary to State Board of Health of Massachusetts. Octavo, 850 pages, with 124 engravings and 12 full-page plates, in colors and monochrome. Cloth, $4.50 net. Lea & Febiger, Philadelphia and New York, 1911.*

At the time of Dr. Harrington's death in 1908 he was engaged in the revision of this well-known book and had nearly completed the chapters on Milk and Disinfection, and his manuscript together with the remainder of the book has been brought up to date by Dr. Richardson, his successor as Secretary to the Massachusetts State Board of Health.

The work is divided into nineteen chapters, although many of these are subdivided into sections, comprising Foods, Air, The Soil, Water, Habitations, Schools, etc., Disposal of Sewage, Disposal of Garbage, Disinfectants and Disinfection, Military Hygiene, Naval and Marine Hygiene, Tropical Hygiene, The Relation of Insects to Human Diseases, Hygiene of Occupation, Vital Statistics, Personal Hygiene, Infection, Susceptibility and Immunity, Vaccination and Small Pox, Quarantine and Disposal of the Dead.

Beginning the book with a discussion of foods in general, their nutritive value and composition, the reader is soon engaged in the study of the different foods meats heading the list and these are considered one by one, then their transmission of disease by meat and fish and the posioning which may occur from the use of spoiled meats.

The next section takes up the study of milk and deals with the constituents, adulterants and methods of testing for same, bacteria, pasteurization, methods of analysis, etc.

Disinfection and disinfectants are fully discussed in a chapter of 110 pages, the various agents being considered.

The chapter on Military Hygiene gives requirements for admission, considers the recruit, his clothing, rations, the camp, disposal of wastes and the diseases to which he is liable, although the latter topic has but just over four pages devoted to it, venereal diseases being dismissed with five and one-half lines.

Each topic is carefully considered and the more important phases emphasized just enough to bring them out.

This book will continue to occupy the place it has long held as a leader in the science of hygiene and is a fitting successor to the earlier editions.

B. L. Arms.

HEALTH DEPARTMENT REPORTS

Chicago, Ill., 1907–1910.

The report of the Chicago Health Department for the period approximately coincident with the commissionership of Dr. W. A. Evans is a remarkable document, perhaps the most remarkable report ever issued by a city department. It is no formal perfunctory record of routine work performed. It is a direct message from a public officer, with a keen sense of responsibility, in which he tells the people of his city what he is trying to do for them and what they themselves should do for their own well-being.

The first section of the report is a review of some important phases of health work by Dr. Evans himself. The principles of sanitary legislation, the problems of housing and ventilation, the disposal of waste, the Chicago water supply and milk supply, the control of contagion, the spread and prevention of the principal communicable diseases, and vital statistics are discussed, each in three or four pages of direct, telling popular writing with citations of important literature, such as Chapin's "Sources and Modes of Infection" and Park and Krumwiede's study of human and bovine tuberculosis. The subsequent sections of the report deal with the work of the different bureaus of the department, contagious diseases, sanitation, laboratory and food inspection, with vital statistics and with the work of publicity and education. The technique of the control of communicable disease and the procedure of sanitary inspection is discussed in detail with reproductions of many of the forms in use. Special features of the laboratory report include studies of the ice supply and of the efficiency of pasteurization. In the section on vital statistics the death rates from principal causes are indicated graphically for every year since 1871. In a brief section dealing with the educational work of the department are reproduced a dozen of the most telling diagrams and cartoons from the well-known *Weekly Bulletin* and other illustrations from the same source are included in other parts of the volume in connection with the subjects with which they deal.

The most notable quality of the report is not the matter it contains, but the manner of treatment. Dr. Evans has infected his associates with earnestness, frankness and readiness to profit by light from any source; and there is scarcely a page in the volume that is not good reading for any one with an interest in public health. Many sanitarians may not agree with all the views set forth. To any health officer, however, who may have grown a little stale in the daily routine of service this report will prove an inspiration, for it will give him a fresh sense that his work is a real and vital one, full of tremendous potencies for human happiness.

C.-E. A. W.

Brockton, Mass., 1911.

The 30th Annual Report of the Department of Health of Brockton, Mass., recently issued, shows the good work done in that city to protect the health of its citizens. In the general remarks special note is made of the housing situation. It is pointed out that Brockton as yet has not reached a point that its housing problem cannot be easily controlled, but warning is made that within a few years, with the increasing population, conditions may arise which will be both difficult and expensive to adjust. The department is thus alive to the dangerous possibilities and will doubtless take steps to see that bad conditions are not allowed to arise. It is, indeed a hopeful sign of the times when Health Departments are taking proper cognizance of bad tendencies and thus checking dangerous potentialities which unchecked would be the despair of future generations of health officers.

The communicable disease record for 1911 was very satisfactory, diphtheria and typhoid fever being very low. There were 635 deaths, giving a rate of 11.26 per 1,000. It is to be regretted that the International Classification of Causes of Deaths is not used or that rates are not worked out for the deaths from the various important communicable diseases. There were 108 deaths of infants under 1 year, a rate of 92 per 1,000 births.

The work of the Laboratory is well presented by Mr. George E. Bolling. This Laboratory might well be taken as a model for other cities of this size.

Jacksonville, Fla., 1911.

The Annual Report of the Board of Health of this city for 1911 is a splendid one and is a public document of which the citizens of Jacksonville should well be proud. It is only the second annual report issued by this city but is far ahead of those issued by many cities which have had modern health departments for many years. Dr. Charles E. Terry, the health officer, indicates the sanitary status of the city in a very strong and lucid manner and does not mince words when it seems necessary. The crude death rate was 21.4 and the resident death rate 17.75. There was a reduction of 171 cases and 22 deaths in typhoid fever as compared with 1910, a reduction of 35%, and Dr. Terry attributes this in a large measure to the passage and enforcement of an ordinance regulating the construction and maintenance of dry closets. The importance of flies as disseminators of typhoid is discussed in some detail and the results of the investigations along this line are well shown. (*See article by Dr. Terry on this subject, this Journal January, 1912.*)

Much work has been done to remove all mosquito breeding places and Medical Inspection of Schools was inaugurated during the year. The population of the city is estimated at 63,641 and the total cost of the Health Department amounted to $33,382.66. 76.1% of the dairy farms supplying milk to the city scored under 60 in January and not in single one in December. There was a corresponding decrease in the bacteria in the milk. A total of 147,155 inspections were made by the 15 sanitary inspectors, during the year.

Space prohibits referring to many of the important results obtained by the Department during the year. The report is recommended to health officers for their perusal and inspiration.

The Milk Supply of New Brunswick, N. J.

Under the title of *Where We Get Our Milk* the New Brunswick Board of Health has recently issued a special bulletin for the benefit and use of the milk consumers of that city. The Bulletin gives (1) the score of each milk producer and general remarks with regard to the sanitary conditions under which the milk is produced and handled; (2) the score of the milk dealers who distribute milk and notes concerning their equipment and methods; (3) the results of inspection of ice cream factories and a list of the material used in its manufacture; (4 tables showing the chemical and bacteriological tests of milk; and (5) information for housewives so that they may be able to keep the milk properly after delivery.

More and more health departments are taking steps to give the necessary publicity with regard to the milk supplies of their cities, and are developing the necessary courage to print the names of producers and dealers with a fair statement of the methods used by them. The method used by New Brunswick seems to be of wide application, particularly for small communities, and the publicity should result in much greater improvement than could be hoped to be obtained by inspection and analyses alone.

PUBLIC HEALTH NOTES

Governor Wilson and Sewage Disposal.

Not wishing to join in the Passaic Valley Sewerage District for financial reasons, the cities of Orange and East Orange and the town of Montclair, N. J., secured land in the neighboring towns of Bloomfield and Belleville, and proposed to dispose of their sewage there with Imhoff tanks and trickling filters. Thereupon Bloomfield and Belleville, backed by those who wished to see Orange, East Orange and Montclair forced into the Passaic trunk-sewer scheme, went to the Legislature and secured a bill prohibiting any city or town from building sewage-disposal works in another municipality without first having obtained the consent of the authorities of such other municipality.

Governor Wilson vetoed this bill because he was convinced that it was based on a most unsafe and unscientific principle. The governor pointed out that questions of sewage disposal should be settled not by neighborhood preferences and jealousies, but by the scientific rules of sanitary engineering, and not with reference to political divisions, but to the topography of the country. He asserted that the State Board of Health should be able to protect political divisions against any deleterious influences resulting from sewage-disposal within their limits, and if its present powers are not sufficient they should be engaged to cover the case.

Eng. News, April 18, 1912.

Bakery Inspection in New York.

Commissioner of Accounts Fosdick has recently made a report to Mayor Gaynor on the conditions of New York bakeries; 145 bakeries of all classes were inspected and defects of location, ventilation and methods of handling were noted in many instances. Personal uncleanliness was most marked in many cases and the law regulating bakeries was frequently violated; particularly those sections prohibiting sleeping in bakeries and the use of tobacco. Conditions in the factory bakeries were found to be generally good.

Mr. Fosdick recommends the amendment of the sanitary code so as to place the inspection of bakeries in the hands of the Health Department in place of the State Department of Labor which now has jurisdiction.

The following suggestions looking towards improving the existing conditions are made:

1. All bakeries to be licensed by the Board of Health.
2. No rooms less than nine feet between floor and ceiling, and no rooms with floors over four feet six inches below the sidewalk level, to be licensed as bakeries.
3. A specific sanitary standard to be observed in all bakeries.
4. Bakeries to be carefully and regularly inspected, both before and after the license is obtained.
5. The Board of Health to have power to close and seal any bakery not conforming to its orders after forty-eight hours' notice.

Experimental Leprosy in Monkeys.

Doctors Duval and Couret contribute a further note upon the experimental production of leprosy in the monkey in the March 1st issue (Volume XV, No. 3) of the Journal of Experimental Medicine. These investigators were able to induce experimentally in a monkey fatal leprosy with all the clinical and pathological manifestations that are noted in cases in men, by the inoculation of a pure culture of the acid-fast bacillus, cultivated by Duval from a leprous lesion in man. In order to do this, however, it was necessary to give the animal repeated injections of large numbers of leprosy bacilli at given intervals for a period of months. It was noted that infection of laboratory animals was more likely to follow when the animals had been sensitized. They assume that the first injection, which may consist of either killed or viable lepra bacilli, caused the sensitization of the animal, and suggest that the necessity of first sensitizing monkeys and then giving repeated doses of the micro-organisms over a long period of time, might explain the fact that man rarely, contracts leprosy, although intimately associated for an indefinite period with those afflicted with the disease.

The authors conclude that the production of leprosy in the monkey proves conclusively that the acid-fast bacillus cultivated from a human lesion is the true leprosy bacillus and not some extraneous saprophyte, and that it is the etiological factor in human leprosy.

The article is illustrated with pictures of cultures of B. lepræ and also with photographs of the monkey showing leprous lesions.

Perspiration and Tubercle Infection.

"Professor Poncet has communicated to the Paris Academy of Medicine the results of experiments regarding the transmission of tuberculosis by perspiration. After bringing about a profuse perspiration in consumptive patients by means of hot-air douches, Professor Poncet made a careful examination of the perspiration and discovered that 42 per cent. contained tuberculosis microbes. Thus, he alleges, the danger of contagion from the clothes of persons suffering from tuberculosis, or from objects touched by them, is very great, and in the future stricter sanitary measure must be taken. All the clothes and objects touched by the patient must be disinfected without exception, and the strictest isolation observed. He points out that his observations add to the many reasons for the prevention of overcrowding. Professor Poncet concluded his report by saying that since the tuberculosis bacillus can leave the body by the skin it can probably enter in the same manner, wherefore a severe hygiene for the skin is to be recommended."

The Medical Officer, April 6, 1912.

Notification of Infectious Diseases.

"For a number of years the Boston Board of Health has been making a vigorous effort to obtain as complete reports as possible of the existence of those infectious diseases in the city which physicians are obliged by statute law to report. Several notices were sent to the physicians of the city calling their attention to this law, and requesting that these reports be sent in all cases to the Board. In spite of this, however, in the year 1909 it was found that 324 cases of pulmonary or laryngeal tuberculosis were not reported, the first intimation of their existence being the presentation of the death certificates. An investigation was made of all these cases and in a great majority it was found that physicians had been called and had made one or two visits. Other cases were reported by medical examiners, and quite a number from hospitals, the cause of death being discovered on autopsy. In 1910 there were 328 cases, and in 1911 but 63 cases, thus neglected. This improvement in reporting followed the prosecution of physicians who were found to be attending cases of tuberculosis and not reporting them. During the present year, 1912, but 14 cases have been found not reported up to April 1. These have all been investigated, and as a result two physicians have been summoned into court. One has been fined $50, the minimum fine which the court can impose on cases found guilty, and the other case is pending.

It is not the desire of the Board of Health to prosecute any physicians, but it is its determination to have these reports full and complete, in conformity with the law. It feels that in no other way is it possible to deal with and control this disease. The Board hopes that the physicians of the city will realize its position in this matter and the importance of their submitting reports on contagious diseases as required by law. Otherwise it feels it a duty to proceed against them, if in no other way it can obtain this information. Physicians reporting infectious diseases will greatly aid the Board in its work if they will carefully fill out the returns, giving information on all the details requested."

Editorial, *Boston Medical and Surgical Journal*, April 18, 1912.

National Conference on Pellagra.

In response to invitations from the State Medical Association and the State Board of Health of South Carolina, the National Association for the Study of Pellagra will hold its next triennial meeting in Columbia, S. C., October 3rd and 4th, 1912, the week following the Washington meeting of the XV International Congress on Hygiene and Demography. Invitations are extended to all persons interested in pellagra to participate in this meeting. The co-operation of officers of the Government Medical Services, State Boards of Health and State Hospitals for the Insane are especially solicited. It is expected that several foreign governments and medical organizations will be represented at the conference. Persons wishing to present papers should address the special committee, consisting of Drs. J. W. Babcock, J. J. Watson and J. H. Hayne, Columbia, S. C.

Heredity and Tuberculosis.

"Professor Karl Pearson delivered a lecture on 'Tuberculosis—Heredity and Environment' at the Galton Laboratory of National Eugenics on Tuesday, March 12th. Professor Pearson threw three pedigrees of family phthisis on the screen, illustrating how phthisis may attach itself to a family for from four to seven generations. He pointed out that this might be attributed to: (a) a hereditary constitutional factor, which rendered the members of the family specially liable to risk; (b) an environment factor, as living in the same house or following the same occupation; (c) direct infection from one generation to a second. As a rule either (a), (b) or (c) were without further investigations adopted according to the *a priori* conviction of the interpreter. Such pedigrees, however, required much more careful analysis. Thus, in the two German pedigrees shown, 62 per cent. of the tuberculous members lived to adult age, 45 per cent. married, and in these marriages only 12 per cent. of the persons who married into the stocks were tuberculous. In the third pedigree a generation had twice been skipped, and the stock (of the landed gentry class) had lived in three different countries and homes besides seeking change of climate and occupation to avoid the family curse. Obviously, such facts needed careful study, not dogmatic treatment. Clearly they had to inquire whether persons living habitually in the same environment and with practically the same risk of infection had the same chance of developing phthisis.

Continuing, Professor Pearson said that the actuarial work of Elderton and Perry did not indicate any marked improvement in the mortality of any class of consumptives who had undergone sanatorium treatment on the death-rates of the same class in pre-sanatorium days. A school of medical opinion spoke of sanatoria as being necessary and efficient 'schools of hygiene.' This might hold for their middle-class patients, but, as shown by the reports of the Local Government Board of Scotland on the administrative control of pulmonary phthisis in Glasgow, it was not true for the lower classes. He held that there existed as yet no concrete knowledge of what sanatoria had or had not achieved. It was cruel to go to the public with glowing accounts of their curative value when they were conscious that their sole service might be the 'school of hygiene' for, or the aggregation of, those advanced cases which were undoubtedly infectious and largely hopeless. The dispensary system must chiefly be judged at present by its effect in Edinburgh. In Edinburgh itself, before the introduction of the dispensary, there were big drops in the death-rate, and since the introduction of that dispensary, other Scottish towns without any such system had exhibited equal or greater declines in their phthisis death-rates. The dispensary system might be doing excellent work, but the evidence for it could not be provided by citing the fall in the Edinburgh death-rate.

In summing up, Professor Pearson said that when they studied the fall in the phthisis death-rate; when they noticed this fall taking place alike in urban and rural districts, alike with or without sanatorium or dispensary treatment; when they say that it started long before the introduction of such treatment and had not been accelerated by increased medical knowledge, then they were compelled to regard that fall as part of the natural history of man, rather than as a result of this attempt to better environment."

The Medical Officer, March 23, 1912.

"Cats and Diphtheria."

"Dr. Adkins, medical officer of health of Devon, reporting on the outbreak of diphtheria in the village of Coleridge, states the district medical officer of health was able to find evidence of infected cats having been the source of the disease. Four cats had died from throat trouble, one being the pet of the first 'case' affected."

Public Health, April, 1912.

Human Engineering.

This magazine, edited and published by Dr. Winthrop Talbot of Cleveland, is essentially a magazine for employers, published to provide a means of exchanging experiences on the human side of industry and a forum for the discussion of the conservation of human energy.

An editorial in the April number points out that "It is a magazine not of philanthropy, but of industrial management and intelligent thrift in its modern and broadest sense." All students of Industrial Hygiene and Diseases of Occupation will find much of interest in this magazine. Amongst the contributors to the April number may be mentioned: Dr. Luther Gulick, Hon. G. v. L. Meyer, Secretary of the Navy, John Calder, Manager of the Remington Typewriter Works, J. B. Andrews, Secretary of the American Association for Labor Legislation.

Hypochlorite at Kansas City.

Mr. Walter M. Cross, city chemist of Kansas City, Mo., contributes a short article on *The Hypochlorite Sterilization of the Kansas City Water Supply* in the April 25th issue of the Engineering News. Mr. Cross points out that the city water, which is sedimented, but otherwise untreated Missouri River water, is at times badly polluted and unsafe to drink. This fact caused many people to use the clear and sparkling waters that issue in many places from springs and wells, and in most instances these waters are at least ten times as badly contaminated as the city water. Consequently, on account of its questionable character, the city water became possibly a direct and certainly an indirect cause of disease.

Since the beginning of 1911 the city water has been treated with hypochlorite, the cost being a little over 15½ c. a million gallons. Mr. Cross gives a table which shows that in 1910, before treatment, there were 107 deaths from Typhoid Fever in the city as against 61 for 1911 after disinfection had been installed. Bacteriological experiments showed that the raw water contains anywhere from 4,000 to 10,000 bacteria per c.c. and the water after treatment as delivered to the city anywhere from 20 to 100 with all tests for B. coli negative.

Ventilation Inspectors.

"We are very much pleased to learn of the creation of a ventilation bureau in Chicago, consisting of a chief inspector and four assistant inspectors.

"That the new bureau is to be administered along broad lines and that the best man obtainable is desired, is evidenced from the fact that the examination for the principal position will be without regard to legal residence in Chicago. The date has not yet been set, but the Commission desires to obtain, if possible, the kind of man who is not alone competent for the present necessities of the bureau, but who will be able to develop it as such a bureau should be handled in the next few years on account of the increasing attention given to ventilation matters."

Engineering Review XXII, No. 3.

Typhoid Carrier on Shipboard.

The Journal of the A. M. A. for May 1911 publishes an investigation of typhoid fever among sailors, made by Dr. W. A. Sawyer of the State Board of Health of California, due to a typhoid carrier in the crew of a lumber ship. Twenty-six cases of the disease occurred on the S. S. Acme scattered over a period of three and a half years. A winch-driver, who had been aboard during the entire series of cases and who had had typhoid in 1908, was suspected to be the cause of the series of cases and examination of his feces lead to the isolation of the typhoid bacillus. The opportunities for infection on board ship are well discussed by the author and stress is laid on the extremely poor sanitation that is frequently to be noted on ships. Dr. Sawyer emphasizes the need for bacteriological examination of the feces and urine of typhoid fever patients and points out that if this winchman had been subject to such an examination the cases (there were four deaths) would have been prevented.

An important point is made of the fact that the cultures freshly isolated from the stools failed to be completely agglutinated by anti-typhoid serum even in dilutions as low as 1–50. In the eleventh transplantation of the cultures, organisms were obtained that were completely agglutinated in dilutions of 1–4000.

Frequency of Tuberculous Infection in Children.

"Although some 30 years have passed since the discovery of the bacillus of tuberculosis, no absolute certainty exists as to the exact way in which infection is most commonly produced. Koch's original opinion, that inhalation of organisms derived from human disease is the important factor, still commands pretty general assent, but another school has arisen which holds that infection starts in infancy by consumption of tuberculous milk, the bacilli lying latent until some depression of vitality in after life gives them a chance to multiply and cause serious disease. In view of the existing doubt it is important to obtain trustworthy information as to the frequency of tuberculous infection in infants and children and as to the apparent portal of entry of the germs. As to the frequent occurrence of tuberculous food in children authorities are agreed, statistics derived from post-mortem examinations giving a percentage of infected cases varying from 35 in London (Still) to 42.5 in Christiania (Harbitz). Attempts to obtain further information by the employment of the tuberculin test have also been made, the results confirming the view as to the frequency of infection in children. A recent investigation on these lines has been carried out by Dr. Charles M'Neal and recorded in the *Edinburgh Medical Journal* for April. The investigation concerned a series of 541 cases, 371 of those being children in the Royal Edinburgh Hospital for Sick Children and the others 170 boys in an industrial school. The methods of employing the tuberculin was a modification of von Pirquet's procedure, undiluted 'old' tuberculin being rubbed into an abraded point of skin. The results obtaned showed, even with the first year of life, a percentage of infection of 14.1, the ratio rising till it attained a height of 46.6 in the fourth and fifth years of life. Among the boys of the industrial school, drawn from the most necessitous classes, the percentage of infection actually reached a figure of 64.7 in boys aged 15 years. It was remarkable, in comparing the figures with those recorded by von Pirquet and others in Austria, that whereas the general mortality from tuberculosis in the latter country is much higher than in Scotland (36.25 compared with 12.53), in Edinburgh the percentage of infection among children was actually greater. The more frequent occurrence of abdominal tuberculosis among children in Great Britain suggests that infection by tuberculous milk may be the factor which explains the unfavourable conditions thus revealed."

The Lancet, April 13, 1912.

Pellagraphobia.

Dr. George M. Niles of Atlanta, Ga. contributes a short article in the May 4, 1912 issue of the Journal of the A. M. A., against the growing unreasoning fear of pellagra which is apparently present in some parts of the south. Dr. Niles states that he is "morally certain that pellagra is due to a active toxicochemical poison generated in spoiled maize, and becoming active after being injected in the human body. He also points out that the evidence is against infection or contagion, and that "it is the consensus of opinion of the majority of thoughtful observers of pellagra that the most efficient prophylactic measures consist in the avoidance of corn products, unless the corn is known to be sound, abstention from alcoholics of all kinds, reasonable care in eating, and all those hygienic precautions calculated to keep the body up to par and in a resistent state." He concludes that "the object of this article, therefore, is to request the profession at large, while assuming a judicial attitude toward the unsolved problems of pellagra, and realizing the possible gravity of the situation, not to permit the seeds of an immoderate fear among the laity to take such root, that they may grow into a wide-spread pellagraphobia, a consummation earnestly to be deprecated."

Typhoid Death Rates as Criteria of Water Supplies.

A recent editorial in the Engineering News gives an interesting digest and criticism of Dr. A. J. McLaughlin's recent paper on "The Necessity for Safe Water Supplies in the Control of Typhoid Fever." In this paper the author has compared typhoid rates in American cities with those of certain Northern European cities. The excess of the American figures is suggested to be due to the inferiority of their water supplies, and further suggests 5 per 100,000 as a normal rate for a city with an unpolluted supply.

The News, while heartily endorsing the purpose of the paper—the improvement of American water supplies,—believes, "that Dr. McLaughlin should have gone further in his statistics or not so far in attributing the low European typhoid rates to pure and the high American rates to impure water supplies." The News points out that "other capacious vehicles exist, particularly in the southern part of the United States, and probably under high temperatures generally," and emphasizes the fact that we need in this country improved methods of board of health control of contagious disease before we can hope to reach the normal typhoid rate suggested by Dr. McLaughlin.

Editorial, Eng. News, Apr. 18, 1912.

Septic Sore Throat in Baltimore and Chicago.

Dr. Louis P. Hamburger, contributes a preliminary note in the April 13th issue of the Journal of A. M. A. on the appearance in Baltimore of septic sore throat, "the new and very terrible disease" which assumed such serious proportions in Boston last year. The Boston epidemic was studied thoroughly by Professor C.-E. A. Winslow and as a result of his investigation a certain milk supply was implicated as the vehicle of the infection. Dr. Hamburger made an investigation of 25 households in which the disease had occurred and found that they had a common milk supply. This dairy was selling milk pasteurized by the "flash" process; they immediately raised the temperature of pasteurization to 160 F and installed a system on the "holder" principle within a week. The cases which occurred later were apparently "neither so severe nor so numerous, do not follow the milk supply, but occur in prosodemic fashion; namely they appear to be transmitted from individual to individual through various channels of communication." It was noted that for a month preceding the outbreak, the milk in question was not being pasteurized owing to repairs being made in the pasteurizing room. A statistical study of the disease is now being made and will be awaited with interest.

Doctors Miller and Capps contribute a preliminary note in the same issue on an epidemic of sore throat due to milk in Chicago. An investigation is being carried on by these observers with the co-operation of the Health Department.

Will Make Babies Immune.

A new and unique work in the anti-tuberculosis campaign is the dispensary for babies opened recently by the Tuberculosis League of Pittsburgh on the South Side of that city at 93 S. 15th Street. The primary object of the dispensary is to attempt to create an early immunity among the babes and children that will prevent the infection during infancy and childhood; and thereby to prevent the outbreaking of active tuberculosis in later life. Dr. William Charles White, Medical Director of the League, under whose supervision the work will be carried on, says that it will probably be ten years before the definite results of this experiment may be appreciated. Commenting on this movement, the Bulletin of the League for March says:

"Practically all tuberculosis infection begins in childhood. In view of this it is felt by the Tuberculosis League that probably money can be better spent in a limited district by taking care of children from the time of their birth and preventing infection in this way than by taking care of them after the State has spent money on their education and care, only to have them finally develop Tuberculosis; thus necessitating a long period of rest and care."

"Not only the sick but also healthy children are taken charge of by the institution. The theory of the society is that by fortifying the body in the earliest period of a child's life the infant will, to a large extent, become immune from the disease with which heredity and environment threaten it. For this purpose special cognizance is taken of the babies' home surroundings."

Instruction will also be given to mothers at the dispensary and everything that can be done to decrease infant mortality in this district will be attempted.

The South Side of Pittsburgh, where the dispensary will work, is naturally separated from the rest of the city, thus making it easy to keep records of the results obtained. The Wyoming Valley Society for the Prevention and Treatment of Tuberculosis at Wilkes-Barre (Pa.) in its work with mothers and babies through its milk committee, has one of the nearest approaches to the Pittsburgh experiment tried in this country.

Clinical Thermometers as Disease Spreaders.

The March number of the Bulletin of the North Carolina State Board of Health reprints from the Journal of the American Medical Association a paper by Dr. E. B. Beasley on "The Clinical Thermometer as a Possible Disseminator of Some Communicable Diseases." It is shown that the etchings on the ordinary clinical thermometer form ample harbors for large numbers of bacteria and that these are not removed by the ordinary process of plunging the thermometer into a glass of water for a momentary agitation or by holding the thermometer under the tap.

Experiments carried out with pure cultures of Bacillus prodigiosus and Bacillus pyocyaneus show conclusively that these bacteria were not removed by the ordinary methods of cleansing thermometers and indicate most forcibly that sterilizing solutions of marked power should be employed by physicians for the disinfection of their thermometers after each use. Since the bacteria can survive after the thermometer is fairly well washed, dried and placed in a case for several hours, it is evident that certain diseases such as scarlet fever, diphtheria, typhoid, tonsilitis, pneumonia, and tuberculosis, as well as many others, might conceivably be disseminated in this way.

Formaldehyde is recommended as a satisfactory disinfectant for use with thermometers and a further suggestion is made that a reliable clinical thermometer should be a part of the equipment of a household.

Compulsory Segregation Law Passed.

The New Jersey bill providing for compulsory segregation of tuberculosis, has been signed by Governor Wilson and is now in force. The law is without doubt the most advanced state legislation on tuberculosis that has ever been enacted in this country, if not in the world.

The new law provides that tuberculosis patients who refuse to obey the regulations laid down by the State Board of Health concerning the prevention of their disease, and thus become a menace to the health of those with whom they associate, shall be compulsorily segregated by order of the courts, in institutions provided for this purpose. If such a patient refuses to obey the rules and regulations of the institution in which he is placed, he may "be isolated or separated from other persons and restrained from leaving the institution." The State Board of Health, working through the local boards is given the power to enforce the provisions through the courts. The law further provides that all counties in the State of New Jersey shall within six months from April 1st, make provision in special institutions for the care of all persons having tuberculosis in these counties. The state treasury will subsidize each county to the extent of $3.00 a week for each person maintained in these institutions except those who are able to pay for the cost of maintenance.

The only other state which provides for compulsory segregation of dangerous cases of tuberculosis, is Maryland. The only city in the United States which has adopted a special ordinance providing for compulsory removal of dangerous tuberculosis cases, is San Francisco. A few other cities, such as New York, exercise this power under certain provisions of their sanitary codes, but no other city has any special ordinance on the subject.

New Jersey now has two county hospitals in operation, one in building and one about to be started. It is expected that the new law will materially increase the number of such institutions because of its mandatory character. Anti-tuberculosis workers will also watch with much interest the way in which the provisions for compulsory segregation and detention work out.

Rocky Mountain Health Association.

The Colorado State Association for the Prevention and Control of Tuberculosis, has changed its name to the Rocky Mountain Health Association, and will aim materially to extend the scope of its operations. The field of work, will be the Rocky Mountain states, and while special emphasis will be given to tuberculosis work, other lines of health work will also be undertaken.

Viability of Typhoid Bacilli in Sour Milk.

The Michigan Agricultural Experiment Station has carried out during the past year an extended series of tests to determine the effect of lactic acid upon the typhoid bacillus in milk. This has been done in view of the suggestions sometimes made that milk which is possibly infected with typhoid bacillus might be fermented and used as a soured milk for drinking purposes because of the action of the lactic acid upon the typhoid germ.

The purpose of the paper therefore, is to determine the viability of the typhoid bacillus in sour milk in the presence of different types of acid-forming organisms. The acid produced by lactic organisms is shown to have an inhibitive influence on typhoid bacillus but the results are not sufficiently conclusive to permit the statement that milk possibly infected can be rendered safe through the activity of the acid-forming organisms. It is shown that the minimum acidity produced by Bact. lactis acidi which will destroy bacillus typhosus is 80° in milk and 28° acid in whey. For Bact. bulgaricum the figures are 28° acid in milk and 66° acid in whey. Since these are high degrees of acidity which, because of the presence of other organisms, might not be attained even with vigorous cultures of acid-producing bacilli, it would seem to be evident that milk in which there was any suspicion of typhoid infection should be destroyed or thoroughly disinfected and that until our knowledge is more definite we should not attempt to secure the inhibition or destruction of typhoid bacillus through the agency of lactic acid.

VOL. II. JUNE 1912 No. 6

AMERICAN JOURNAL OF PUBLIC HEALTH

METHODS OF ACCOUNTING IN THE COLLECTION OF CITY WASTE

P. M. Hall, M.D.,
Commissioner of Health, Minneapolis

Read before the Municipal Health Officers' Section, American Public Health Association, Havana, Cuba, December, 1911

The collection of garbage, ashes, rubbish and other forms of city waste is as much of a business as is the selling of dry goods or diamonds and should be done with as close attention to business detail. Whether the collection is done by private contract or by the municipality itself, it should be conducted upon business lines and not as a charity. The tendency with municipally controlled activities is to use them to make places for the lame, the halt and the blind. The collection of garbage is a business and not a charity.

No standardization of municipal accounting in the collection of city waste has been brought forth. Even the statistics of the United States Labor Department are bewildering and furnish no basis for comparisons. Some system of accounting should be devised that would commend itself on account of its simplicity and accuracy.

The kind of garbage, whether wet or dry, wrapped or unwrapped, mixed or unmixed with rubbish or taken as free from rubbish as possible, whether mixed with ashes or any other substances should be clearly shown. The composition of household waste is practically the same in all American cities, any variation from the average occurring in the different sections of the same city. The character of garbage in the can varies with the system of disposal and the household rules for primary separation. There may be a "one-barrel," "two-barrel" or "three-barrel" primary separation by the householder.

Certain rules should be made defining clearly the method of separation desired. These rules should as nearly as possible meet the requirements of the particular method of disposal of the city in question, not losing sight of the necessity and desirability of sanitary procedure at every step from collection to final disposal. These rules should be printed in various languages and widely distributed, preferably, through the medium of the collector. They should be printed on a light card so that they may be hung in the kitchen, always in plain sight for the instruction and guidance of the householder.

Growing out of the question of primary separation, arises another question of whether a separate set of collectors and teams should be employed for collecting each distinctive kind of refuse. This again is governed very largely by the method of disposal. Where the reduction system is employed, garbage alone, and as free as possible from rubbish must be taken to the disposal plant. The balance of the waste, that is, rubbish and ashes, must be collected in various ways. In some cities the rubbish is mixed with ashes and dumped; in others the rubbish is incinerated and ashes handled separately. In cities employing incineration for the destruction of their garbage, it is more convenient to have the householder put the combustible rubbish with the garbage, the ashes being handled separately.

Another factor comes into the system of accounting, namely, whether or not a city is districted into certain definite districts, and the same team handles the various kinds of refuse from that district; or whether the garbage of the whole city is collected by one set of teams, the rubbish by another, and the ashes by still another. As may well be seen, all these different methods require or should require separate forms of accounting, which should be made to show as nearly as possible the cost of collecting each kind of refuse in order to make a basis for fair and equitable comparison.

With the refuse upon the wagon, there enters into the accounting the question as to whether or no the conveyance in its entirety is the property of the city or contractor, or whether a portion of it is furnished by the driver and the balance by the city or contractor; and as to whether or no the team is owned by the city or contractor, or by the collector. These items should all be carefully stated for the purpose of comparison.

The length of the haul, as nearly as it can be figured in averages, with a statement of the square miles of territory to be covered, should be given. Then again, it makes a difference whether the whole of the haul is directly to the disposal plant, or to a transfer station or stations, the balance of the haul being made by some other conveyance, railroad or otherwise. The haul by team should state as nearly as possible the average mileage traveled. The length of the haul by rail should be stated specifically, the cost per car for the service, whether the city or contractor is responsible for the upkeep of the cars, and whether the city or the contractor furnishes the ground and equipment at the transfer station for handling the refuse. Careful statement should be made as to the number of men and teams employed, and the hauling capacity in cubic feet of the wagons or carts used.

Careful mention should also be made of the men employed in the office of accounting and supervision as, for instance, the superintendent and assistants, telephone operators, engineers for handling hoists and, in fact, all whose wages are properly charged to the collection of waste.

In the accounting between the collection department and the citizen, a great deal may be done in keeping systematic record of all complaints, and a definite check be kept upon the activities of each individual collector. The number of places receiving the service of collecting the various forms of refuse may be recorded and indexed by the use of vari-colored cards. A convenient card is one made to represent a city block. The dividing line between districts should come in the middle of the street and each district comprise a certain number of city blocks. These cards, each representing a city block, should be arranged by the clerk in charge of complaints, in the order in which the garbage or refuse is to be collected by the driver. The drivers should be instructed to make collections in this order, and to collect a block entire before passing to the next one. At the close of a day's work, the driver reports where his collection for the day ended, and it may be indicated by a guide card showing the day of the week. An absolute check on the collector's work is thereby made possible. It accomplishes another thing; that is, it makes it easy to locate the collector at any time, by simply noting the block upon which he is to begin work on a respective morning. This reduces the business of collection to a system, instead of the haphazard way of turning a man loose in a certain territory and telling him to return with the "stuff." As each collector returns to the disposal plant or transfer station. the character of the load, the number of the wagon or box should be recorded. This clearly identifies the load and the man who delivered it, and serves as a means of checking up complaints or inquiries that may come in during the day.

Complaints so received should all be recorded upon a loose-leaf ledger, and a slip handed to the driver of the particular district from which the complaint comes. As an offset to the citizen's complaint ledger, should be leaves adjoining in the ledger, giving the report of the driver upon each complaint — no cause, bad condition of cans, or other reason for refusing collection. This dual loose-leaf ledger system operates in minimizing complaints. As a general average, over 90% of the complaints received are due to faults of the householder and a careful driver through his reports to the complaint clerk, often anticipates the complaint. The complaint clerk, by referring to the ledger, can explain to the citizen at once why he is not receiving service.

A careful record should be kept showing the daily, weekly and monthly record of each collector's work, so that changes can be made in equalizing the work of the various collectors. This record should take into account the number of loads collected, miles traveled, and complaints recorded in each district. This can all be easily done, without much labor or cost, by the use of specially ruled books.

Nothing has been said thus far as to the weights of the various kinds of refuse, for the reason that the question is too frequently a mere estimate. Waring's tables giving in pounds the average annual per capita amounts of the different kinds of refuse collected in various cities are still standard. Some cities weigh their garbage; I doubt if any weigh all of it. Some weigh a certain number of loads in the summer season and in the winter season, and make their estimates from the average of these weights. The accounting by cubic feet or yards is also unsatisfactory because it cannot take into consideration the difference between small and large loads, or the fact that one driver will "tramp" his load, while another, to save his team, is careful not to. If weights are to be relied upon, every load should be weighed. Fortunately, we have a method of accounting which is more accurate for purposes of comparison, when all the conditions of collection are taken into consideration, and that is, the per capita cost per year, based upon the census population, taking into account all of the various forms of refuse that are handled. Estimates of weights may be made in this connection, simply to show that the average amount per capita per year of each kind of refuse is being collected.

These suggestions are offered as at least an attempt to reduce the methods of accounting in the business of collecting city waste to some system.

A STANDARD FORM FOR STATISTICS OF MUNICIPAL REFUSE

SAMUEL A. GREELEY
Chicago, Ill.

The realization of the value of proper municipal sanitation is growing rapidly in this country. With the increasing congestion in cities, the conduct of public departments is becoming more difficult. By dint of hard scientific work, available methods for securing a proper measure of sanitation have been kept abreast of the conditions, one important factor in this progress is experience. Experiences, however, are useful to others chiefly according to the care and regularity with which they are recorded; and experiences derived from several sources, are more useful, if they are recorded with some degree of uniformity.

In many cases, the interpretation and use of experience can be made properly only by experts. This is true because, in many branches of Sanitary Engineering, the same methods are not applicable everywhere and the experiences of one city must be applied with care and understanding, to relieve conditions in another city, Most branches of city sanitary work call for more expert application in their routine operation, than does the collection and disposal of refuse. This requires a high degree of organizing and managing ability. The management may differ—the methods used not. One who has investigated refuse disposal work abroad, cannot but be impressed with the uniformity of methods used there, more especially for the house treatment and collection of refuse, but also for the disposal. German cities are approaching a common standard in this work. Differences in the effectiveness of the service are in large part due to differences in the ability of the department chiefs in charge of the work.

The obvious suggestion born by these considerations is that an intelligent familiarity with methods employed in different cities and with the results accomplished thereby, will be of great use in widening the vision, of the department chief, in bringing good and bad methods to his attention and in this gradually bringing the better methods into more common use. In no better way can this be accomplished, than by a wide-spread use by city officers of a standard form for statistics of municipal refuse.

It is on this account that the attached standard forms have been prepared and presented to the American Public Health Association. The forms are divided to cover the different parts of refuse disposal work. After provision for a few general facts describing the city for which the statistics are prepared, there follow four sections, dealing respectively with Refuse Materials, House Treatment, Collection and Disposal of

Refuse. These sections are subdivided to bring out the details of the work. In preparing the forms, two functions were considered: (1) its usefulness to other cities and (2) its usefulness to the department keeping the records. In order to be valuable, the form must fulfill these two functions.

It is hoped that a committee of the Association will be appointed to undertake a final revision of the forms and an annual compilation of the resulting facts.

STANDARD FORMS FOR STATISTICS OF MUNICIPAL REFUSE

(The forms herewith reproduced were presented at the annual meeting of the American Public Health Association, Havana, Cuba, December, 1911.)

........................Ending................19

(1) Name of City........................

(2) Population.........................Year...................................

(3) Character of Population	Distribution by		
	Property	*Area*	*Population*
Per cent Residential			
Per cent Business			
Per cent Manufacturing			
Per cent Foreign			

A. Statistics of Refuse.

(4) Average daily quantity of refuse:

	Summer		*Winter*		*Average*	
	Yards	*Tons*	*Yards*	*Tons*	*Yards*	*Tons*
Garage						
Ashes						
Rubbish						
Total Refuse						

(5) Weight per cubic yard:

	Minimum	*Maximum*	*Average.*
Garbage			
Ashes			
Rubbish			
Total Refuse			

(6) Quantities of Refuse:

	Pounds per Capita per year.	*Pounds per 1000 Population per day.*
Garbage		
Ashes		
Rubbish		
Total Refuse		

(7) Mechanical Analyses:

	Glass	*Bones*	*Paper*	*Rags*	*Metals*	*Wood*	*Dust*
Garbage							
Ashes							
Rubbish							
Total Refuse							

(8) Chemical Analyses:

	Carbon	*Water*	*Ash*	*Volatile Matter*	*Grease*	*Tankage*	*Ammonia*	*Potash*
Garbage								
Ashes								
Rubbish								
Total Refuse								

B. Statistics of House Treatment

(9) Size of House Can
(10) Type of House Can
(11) Number of Cans
(12) Location of Can
(13) Is Can set out for collector?
(14) Number of separations
(15) Is the garbage drained or wrapped in paper?

C. Statistics of Collection.

(16) Is collection done by city or by contract?
(17) Does the city own the stables and equipment?
(18) Number of collections per week.

	Summer			*Winter*		
	Business	*Residential*	*Outlying*	*Business*	*Residential*	*Outlying*
Garbage						
Ashes						
Total Refuse						

(19) Average length of haul:—(Grades)
Garbage
Ashes
Rubbish
(20) Type of Collection Wagons used:

	Garbage	*Ashes*	*Rubbish*
Capacity (cu. yds.)			
Material			
No. of horses			
Attendants per wagon			
How dumped?			
Covered?			
Maker			
Cost			

(21) Frequency of washing wagons:
Method of washing wagons:
(22) Equipment required:

	Summer			*Winter*		
	Garbage	*Ashes*	*Rubbish*	*Garbage*	*Ashes*	*Rubbish*
No. of wagons	....	....	....	....	....	....
No. of men	....	....	....	....	....	....

(23) Cost of collection per ton:— Garbage Ashes Rubbish

D. Statistics of Disposal

(24) Method of disposal—Garbage
Ashes
Rubbish

Sanitary Aspects.

(25) Disposal by dumping:
Classes of refuse dumped
Number of dumps
Area of available dumping grounds
How are dumps kept up?
Cost of disposal per ton

(26) Disposal by burial:
Location
Character of soil
Area required per ton per year (sq. feet)
Frequency of using soil
Number of men employed
Cost per ton.

(27) Disposal by feeding to pigs:
Is the disposal by the city or by contract?
Annual payment to contractor
Location of piggery
Number of pigs kept—Summer
Winter
Number of pigs lost per year
Are the pigs vaccinated?
Is the garbage sterilized before feeding to pigs?
Number of men employed at the piggery
Gross cost of operation per ton of garbage
Revenue per ton of garbage

(28) Disposal by reduction:
Location of reduction plant
Type of plant
Quantity of garbage reduced per year, tons
Number of men employed at the plant—Summer
Winter
Cost of plant
Gross cost of operation per ton
Quantity and value of by-products
Revenue per ton

(29) Disposal by incineration (including rubbish sorting)
Capacity of each plant............Number of plants............
Classes of refuse burned
Location of plant
Type of plant
Coal used per ton of material burned
Total number of men employed at the plant—Summer
Winter

Gross cost per ton
Revenue per ton
Cost of plant
Value of power developed
Clinker utilization

E. Miscellaneous Statistics.

(30) Under what city department is the work done?
(31) How is manure kept at stables?
How is manure removed? .... How disposed? ....
(32) Are there loading stations in the city?
If so, how many and for what classes of refuse?

THE DEVELOPMENT OF A MUNICIPAL LABORATORY

George E. Bolling,
Brockton, Mass.

Read before the Massachusetts Association of Boards of Health, April 25, 1912.

A paper read before the Mass. Association of Boards of Health nearly five years ago by Dr. E. C. Stowell entitled "The Possibilities of a Clinical Laboratory in a Country Town in Relation to Public Health Work" told interestingly both of the good work accomplished and the difficulties to be overcome by a pioneer in that field in a community without gas or public water supply; and more recently, in January 1911, Mr. C. K. Blanchard, agent of the Wellesley Board of Health, in a paper on "Modern Board of Health Methods in a Small Town" discussed a similar establishment in Wellesley, the latter, however, being on a considerably more pretentious scale.

It is the purpose of this paper to draw attention to some of the possibilities existing in small cities in clinical and public heath laboratory work and also in various lines of municipal laboratory work the latter being applicable as well to cities that could not properly be classed as small.

Sixteen years ago the writer was appointed assistant in the laboratory of the Sewerage Department of Brockton, which was devoted entirely to the analysis of sewage and effluent for the purpose of the most efficacious operation of the sewage-filtration plant of that city, the policy of the heads of the department being to maintain the laboratory merely for daily operation and record rather than for any research, in fact, during 12 years of service but one piece of experimental work of some two months' duration was permitted.

Succeeding within two years to the charge of the laboratory, with the duties about evenly divided between chemical and clerical, and being by nature, fortunately or otherwise, of an inquiring turn of mind, the daily grind of routine analyses and record keeping palled upon us, as the editorial writers say, and created a longing for work of a live character.

The physicians of the city having made it evident that they wished quicker reports on contagious diseases than were available from the state board of health by petitioning the local board to establish a laboratory for such purposes, in 1902 the Sewerage Department heads gave their consent for the writer to undertake the diagnostic bacteriological work of the local board of health provided it would not interfere with the regular work of the laboratory. The board of health furnished the funds for the purchase of a microscope, incubator and such other apparatus as was necessary and early in 1902 the first examinations were made.

The laboratory being situated at the filtration plant, some four miles from the centre of the city, and funds not being available for a messenger it was necessary to make arrangements with the officials of the electric car line between Brockton and Taunton, that passed within a few hundred yards of the plant, to receive the specimens which were sent out daily, at a certain hour from the board of health office and put aboard the car at the centre, and to deliver them to the laboratorian waiting at the point nearest the plant. This, as may be inferred, occasioned considerable bother and lost time waiting for cars that when coping with the snows of winter maintained a very uncertain schedule, to speak as kindly as possible of a cross-country electric car line. However, to give the system its due credit, of the many hundreds of shipments made during the period of over seven years it was kept up, not a single specimen went astray.

At the outset the board of health decided to make free of charge the following examinations: diphtheria, tuberculosis, typhoid fever, malaria, the examination of sputum for pneumococci and influenza bacilli, for gonorrhoea when the patient could not afford to pay and also the sanitary analysis of well water when it was thought that sickness might have been occasioned by its use.

At the end of the first year it was found that some 398 examinations had been made, of which 62% were for diphtheria, and 30% were for tuberculosis diagnosis. That the work has been constantly on the increase is evident from the total of 4183 examinations made ten years later in 1911, an increase of 951% on the first year's work.

The outfits adopted for use in Brockton were modeled mostly after those developed by the laboratory of the Boston Health Department, which had made its start some four years earlier, and were found to give satisfactory service. During the first year's work there also developed a demand for the testing out of some of the numerous disinfectants that the board of health was being besieged to purchase, and occasionally a sample of wall-paper was submitted to be tested for arsenic which was done for the applicant free of charge.

The board of health early decided that the demands for anaylsis of urine could not be undertaken upon a free basis as it was obvious that a laboratory maintained at the public expense for investigations relative to transmissible diseases, hence of interest to the entire community, would be going out of its province to cater to requests that interested single individuals only, such as the possible presence of albumen or sugar in the urine; the bacteriological examinations of urine, however, for presence of tubercle bacilli were deemed properly to enter upon the free list.

From the very beginning, some difficulty was experienced in getting rid of individuals who demanded free analyses of patent medicines and the like, in order to obtain the formula that they might either put it up for home use or enter it for sale in the regular market.

As the reputation of the laboratory grew, such requests became correspondingly more numerous, and some of the demands made for work of this character were, to a man who was painfully aware of his own limitations, rather staggering. One case the writer recalls being of an individual who stated that he had been told by Alderman So-and So to say that he had sent him and to make the little analysis he wanted. The party went on to say that one of his relatives, sometime deceased, had been a physician and was wont to use a remedy of his own compounding for certain ailments, the formula of which was lost. The party had about ½ oz. of the compound, however, and stated it was known to contain ginger, rhubarb, gentian and peppermint and they were in doubt of 6 or 7 other things, but those could be located by an analysis, capsicum, opium, and valerian, he thought some of them were, any way he would be back by closing time that afternoon for the formula. Needless to say he is still waiting.

Before long another species of individual became in evidence, namely, the unfortunate afflicted with that form of dementia whereby he or she is convinced that somebody is trying to poison them, almost always by surreptitiously incorporating said poison with their food. The writer finds by reference to his records no less than fourteen such cases in the last twelve years and in only one of which was there anything wrong except with the mind of the complainant.

One case recalled at this time had its amusing features: A thin little man bearing a large suit-case came hurriedly into the laboratory one day and drawing the writer to a corner confided that his wife had grown weary of him and was now endeavoring to eliminate him from her society by slowly poisoning him to death. Asked how he knew this he explained that the food he ate at home always distressed him and gave rise to certain definite symptoms while food of a like character partaken of elsewhere proved perfectly harmless. He said that he had talked the matter over with a drug clerk in his town and with him had looked the matter up in the latter's books and learned therefrom that he had all the symptoms of aconite poisoning, and so would the writer please analyze the various articles of food he had brought in his suit-case as he felt certain they all contained much aconite. He had brought cold meat, the various vegetables of a boiled dinner, some cold tea, part of a pie and even some sugar from the sugar bowl, all of which he would leave as he must hurry home to supper. Asked if he didn't fear eating at his home when he was convinced of his wife's duplicity, he said he did not for while his symptoms had been manifest for some time he always ate heartily so as not to apprise her of his suspicions and would then retire to his room and take an antidote. Asked if he had any objection to telling what his antidote for aconite-poisoning was he said he had not, it was a Cascaret.

Disregarding reminisence, and returning to the progress of the laboratory, we find it being conducted for the next four years, jointly by the Sewer Dept. for its routine work and the Health Dept. for diagnostic bacteriological work.

In 1906, however, the health board decided to take up the sanitary inspection of milk and appointed the writer its agent for that purpose and also for the first time provided an assistant who beside his general laboratory duties also acted as collector of milk samples.

In the same year, also, the local Water Dept. decided that it might be wise to insure the purity of its supply by frequent analyses o fthe inlets of the lake from which the water was taken, and made arrangements to have these analsyes—chemical and microscopical—made at this laboratory.

It will be seen that the laboratory was now serving three city departments regularly, health, water and sewerage, and moreover, other departments such as the fire and school, were occasionally making use of the facilities; the Police Dept. also had for some time been bringing such of its problems as could be assisted in their solution by aid of chemistry to the laboratory, the bulk of their work, however, being examinations of seized liquors for alcoholic strength. Regarding this particular branch it may be of interest to relate one incident to show how the various lines could be made to correlate.

A certain "drug store" had for some time been under suspicion of illegal sale of liquor to numerous undesirable citizens who made the vicinity a decided nuisance to the neighbors and as repeated raids by the police failed to secure any evidence in the line of wet goods, they became convinced that the place was selling nothing but straight "drug-store whiskey," so-called. This, as you probably all know, is made while the customer waits by quickly putting together alcohol, water, caramel color, and beading oil, the last named being a compound of oil of sweet almonds, sulphuric acid and ammonia. Trying a new tack the police inspectors raided the place while customers were inside and proceeding directly to the back room succeeded in getting a quantity of what they alleged to be the aforementioned "drug store whiskey". The owner claimed that it was a medicine that was purchased from a distant city and was not intended as a beverage and had not been made on his premises. Chemical analysis indicated its identity with the artificial whiskey described and upon passing a portion through a Sedgwick-Rafter filter the subsequent microscopical examination disclosed the characteristic organisms of the Brockton Water Supply, melosira being present to the amount of many hundreds to the cubic centimeter. The defense retained the ablest criminal lawyer thereabouts and finally at the trial everything hinged on whether the compound was "drug-store whiskey" made on the premises or really medicine. In testifying, the writer stated that so much city water had been found present, laying apparently unconscious stress upon the words "city water." The counsel for the defense rose to the bait and, as soon as his inning came round, at once demanded how city water was proven to be present when it could as well have been and probably was well water. Then was sprung the result of the microscopical examination with the statement that the compounding had undoubtedly been done at that time as melosira and asterionella were then present in such numbers as found. It was a new one on him and the jury convicted the druggist.

Also the Medical Examiner found the laboratory a ready help in clearing up obscurities and used it whenever occasion required, the same being the case with the District-Attorney.

View of one end of Brockton City Laboratory

The surrounding towns that wished quicker results than could be obtained by sending their diphtheria cultures to Boston made arrangements with the laboratory to have such work done for them and at present the boards of health of seven such towns are doing this; while the total number of cultures examined for them in a year is not large, never exceeding fifty all told, the gain in time is an immense advantage.

For three of these towns chemical and bacterial examinations of milk are made, this latter work being confined to from one to four separate collections a year, which while being wholly inadequate to insure a complete inspection, serves, however, to stimulate the interest of these boards in the matter.

In 1908 the Water Department expressed a desire for more definite knowledge regarding the coal it was buying and a calorimeter, a Parr instrument, was installed at the laboratory. The first lot of coal purchased on a specification basis yielded a rebate from the dealer of some $60.00 more than the cost of the apparatus and we haven't had anything since but what has exceeded the specifications.

Our work in sanitary milk inspection had disclosed numerous cases where the statute laws in relation to milk were being regarded disrespectfully by dealers and all efforts to interest the regularly appointed local inspector of milk failed utterly. We found this office occupied by an estimable old gentleman who had held it somewhere between a quarter and a third of a century and who stated that he proposed to continue as he pleased, which was to merely issue the annual license according to the State law, for which service he was accustomed to remuneration from the city to the amount of fifty dollars yearly. As he was irreconcilable to board of health participation in work to the extent of actual inspection and had a peculiarly strong hold upon the political powers of the city, recourse was had to the State legislature in 1909 which was asked to amend the old statutes and place supervision of the milk supply altogether in the charge of local boards of health. Other boards represented by this Association joined the movement with enthusiasm and the desired legislation was secured.

Our milk work, both in enforcement of our sanitary regulations and of the Statute laws, appealed strongly to the public and to the local newspapers, our efforts and findings being given generous space by the latter. A recent review of the articles printed in the two local dailies since the inauguration of the work in 1906 to date shows that 2787 inches of space or 18.5 full pages in all have been accorded to us.

Our experience in the supervision of our local milk supply has shown us that the appearance presented by a dairy or the score it obtained was not a criterion of the cleanliness of its product, and that intelligent personal supervision by the owner of the detailed work in a dairy essential to the production of clean milk went further toward securing such a product than fancy equipment turned over to hired help. Our motto became "The proof of the pudding is in the eating" and when the milk taken from the wagons of the dealers when ready for final delivery to the consumer showed a clean product we did not insist on more or less costly changes at the dairy that regularly marketed such milk.

We became convinced, also, that there was an economic side to the milk question and that it vies with the health aspect in importance, for as runs the famous receipt for rabbit pie—"first catch your hare"—so someone must first produce the milk, and if it is not made a profitable undertaking for someone, who will produce it and then where does the health question enter in?

Our final conclusion was that the proper way to inspect milk was by the laboratory and if anything was wrong an inspection of the dairy became necessary, and that to rule indiscriminately that each dairy must be equipped thusly and score a certain percentage was unnecessary. Looking at the matter from this point of view it was not difficult to appreciate the plaint of a farmer at a recent hearing on the milk situation held at the State House wherein he stated "a mess of doctors have got together and made up a score card for us farmers and published their findings" and he proposed that the farmers get up a score card for the doctors and publish the findings and said he, "then see what will happen to some of them."

The court work incident to a proper enforcement of milk rules and laws is not its most uninteresting feature; during the local board's participation in sanitary inspection for 6 years and Statute law inspection for 3 years, six cases have been prosecuted for violation of the regulation fixing the limit of bacteria permissible in milk intended for sale at 500,000 per cubic centimeter and fined a total of $250; 18 cases were brought on account of added water to milk and fined a total of $1750; three on account of skimmed milk and fined a total of $150, and but one case for milk below standard merely which was fined $20.00. Convictions have been secured in all cases brought to court.

It may not be amiss at this point to voice out belief that Brockton's milk supply has reached a high standard of cleanliness: the average bacterial content of milk collected from dealers' wagons in 1906 of 820,000 per cubic centimeter being lowered to 273,000 by 1911. From 20 to 30 out of the total of 94 wagon dealers finish each year with an average of below 50,000, and many have completed a year with an average count of below 10,000 for their product. While this indicated on the whole a clean milk supply it was observed that occasionally deaths of infants would occur in families supplied with the best milk which lead the board to health to feel that to further minimize infant mortality more must be done than to make and enforce milk regulations and that it was essential to educate the family in the proper care of clean milk after it is left at the door. Just how far to go appeared a delicate matter, but a four-page circular was drawn up and is sent to every home from which a birth is reported. Two pages are devoted to the care and feeding of the infant, one page to the proper care of milk in the home, and the last page was a reprint of the article "Beware of Flies," authorized by the Mass. Association of Boards of Health. These circulars were first sent out in the summer of 1911, and while it may be merely a coincidence, we believe the low infant mortality in Brockton last summer and fall to be due in large part to the influence of this circular. The average infant mortality for the fourteen years ending with 1910 was 104; that for the year of 1911 was but 80.

In 1909 the work of the Health Department side of the laboratory having increased to an extent that rendered both the distance the filter beds laboratory was from the centre and the lack of space it afforded a serious handicap, and taking it into consideration also the not infrequent interruptions of telephone service in the winter time and the lack of the electric current for power and light, it was decided by the Health and Water Departments to jointly establish a laboratory in City Hall where rooms were available through being vacated by the school committee removing their quarters to the new High School building. The chemical work of the Sewerage Department was continued at the filter beds laboratory, the writer being retained in an advisory capacity.

Altogether rooms with about 2000 feet of floor space were made available for the new laboratory, all being on the third floor of the building.

In the round room of the tower, which is 30 feet in diameter is located the main part of the laboratory equipment. In this room there are 8 large windows each of an area of nearly 35 square feet, flooding the room with an abundance of light. Halfway around the room, following the wall has been constructed a semi-circular bench. On this are located the microscope and accessories, a small iron sink, shelves for reagents, the analytical balance and another for coarser weighing, burette-racks, stills and condensers for water analysis, and a combined suction and blast apparatus.

At one end of this long bench is placed the large wooden sink, 6 x 2 feet, the drying racks and drain board and over the sink is fastened an instantaneous water heater with electrical ignition. Next is a small bench with a combination laboratory microtome which can be used for frozen section, paraffin or celloidin work. Adjacent to this is a large refrigerator.

On the opposite side of the room is located a commodious fume closet and on a bench next to this are located the water stills, one continuous and one for redistilled water, a hot-air sterilizer, a "multiple-unit" electric furnace and a large water bath.

In the centre of the room are located 4 large benches fitted with drawers and closets. On one is located the 37½° incubator and a battery of 8 Sedgwick-Rafter filters.

On another bench is located a Freas electric drying oven, a rotating-anode electro-analysis apparatus and a calorimeter.

A third bench, which is 17 x 3½ feet on top, and is fitted with 72 drawers and 14 closets, (secured gratis from the old High School building.) besides being piped for gas is used for the miscellaneous work and upon it also is kept the polariscope, a Schmidt & Haensch half-shadow instrument, and the viscosimeter. The fourth bench accommodates a Simplex electric oven and an expansion closet for use in flour testing.

A large double closet, fitted with drawers below and glass front above standing near the centre of the room is used for the storage of chemicals and apparatus.

On a small bench fastened to the wall and braced with iron bars is located an electrically-driven centrifuge, used in both chemical and bacterial examination of milk samples as well as in general work, interchangeable heads being provided.

An autoclave and an Arnold sterilizer are also included in the equipment of this room. The twenty degree incubator is placed in a small closet next to the refrigerator, the waste water from which is conducted through the double wall space of the incubator, the temperature of which is then kept at 20° by means of a Lautenschlager thermoregulator.

A small room adjoining holds a Fairbanks cement-testing machine, mixing table and storage closet, a grinder for preliminary crushing of coal samples and a set of sieves for the mechanical analyses of sand. Another small room has been constructed for a dark room and fitted with the usual conveniences.

In the office are located the desks of the director of the laboratory and the clerk, filing cabinets, safe, and book cases containing a technical library of some 400 volumes. On the walls are framed pictures inscribed also with the records of the dairies leading the list of clean milk producers since the inauguration of that work in 1906.

The work of the laboratory, as present conducted, falls under the following headings:

Bacteriological Diagnosis.
Bacteriological milk examinations.
Chemical milk examinations.
City water supply examinations, chemical, bacterial and microscopical.
Coal analysis.
Oil examinations, both lubricants and road oils.
Cement testing.
Analysis butter, cheese and vinegar.
Flour testing.
Disinfectant testing.
Pathological examinations of specimens from abattoir.
Examinations for Police Department and miscellaneous work.

The methods employed are as nearly as possible those adopted by the several national societies. Thus the bacteriological examinations are conducted as recommended by the special committees of the American Public Health Association. Water analyses, chemical and bacterial and bacterial examinations of milk are made according to the reports of the special committees on standard methods.

Coal is examined according to the method recommended by the American Chemical Society, and cement by the standard specifications of the American Society for Testing Materials.

Butter, cheese, vinegar and other food materials according to the methods of the Association of Official Agricultural Chemists.

Disinfectants by both the Hill glass-rod and the Rideal-Walker drop methods.

For flour there appears to be a multiplicity of methods all having their advocates, some of whom earnestly belittle the specifications of others. The scheme adopted is that given in an article appearing in the Journal of the American Chemical Society, Vol. 29, pp. 910–921, which investigates both the chemical and baking qualities of the sample.

Last year some 4183 examinations were made for the Health Department, divided as follows: diphtheria 225; tuberculosis 678; typhoid fever 175; malaria 60; other diseases 136; typhoid carriers 29; water analyses 18; bacterial milk exams. 1298; chemical milk exams. 1381; butter, cheese and vinegar 183; while for the Water Department 527 examinations were made, as follows: chemical 150; microscopical 166; bacterial 114; coal 40; cement 57; these two departments, the largest contributors sending together 4710 examinations to the laboratory.

During the past ten years over 19000 examinations have been made, this including milk work for about half of that time, which, for a city the last census credited with a population of about 57,000, indicates a desire to know "where they are at." The figures as given do not include the analyses made for the Sewerage Department at the filter beds laboratory.

The laboratory force consists of a director, one assistant, one clerk and one volunteer assistant, who is preparing for a government examination.

If this record of the Brockton laboratory, sketched in this reminiscent manner, serves to indicate to any beginner the lines of municipal laboratory work that may be advantageously taken up, its purpose will be achieved.

STATISTICS REGARDING INCREASED NUMBER OF THROAT INFECTIONS IN BOSTON FEBRUARY, 1912

WM. PEARCE COUES, M.D.,
Boston

Read before to Massachusetts Association of Boards of Health, Boston, April 25, 1912

Early in February, 1912, a sudden increase of acute throat infections, usually more prevalent at this season, than any other, was noted in Boston. Some of the cases seemed to have a striking similarity to those of the May 1911 outbreak in and about Boston. The bulk of the cases occurred during the week of February 10–17. Many of the serious cases were treated in this period. The Board of Health sent out the following letter February 15, 1912.

> "Dear Doctor: Will you please report to the Board of Health all cases of tonsillitis that have occurred in your practice since the 10th instant, and when possible give the milk supply and state whether or not it is pasteurized.
>
> Very truly yours,
> P. H. MULLOWNEY,
> *Commissioner.*"

Two hundred and twelve replies were received by the Board of Health dealing with 227 Boston cases. Very few of these cases were reported as occurring before February 10th. These are included in the general statistics. Most of the letters came in from February 15 to March 3d. One physician reported 43 cases of acute tonsillitis or septic sore throat occurring within a short period of time in February. Twenty-nine of these cases were on one milk supply, unpasteurized. Fourteen were on different supplies. Among these 14 cases there were no bad throats. Most of the bad throats and all of the streptococcus ones showed an exudate ordinarily covering the whole throat and in some cases extending on to the lips. No such throats were seen in this physician's practice before February 10th. None were seen after February 17th.

A physician in a neighboring city who had many cases of throat infection in May 1911, said that he had had 12 cases in a short space of time in February, nine cases between February 9 and 15. Three of these developed peritonsillar abscesses. Nine of these were on one milk supply, unpasteurized, the same as the 29 cases reported above in the Boston epidemic. Of the 227 cases reported in Boston, it was found that in 21 the milk supply could not be definitely ascertained after considerable search, thus leaving 206 cases with definite and known supply of milk. These were divided thus:

Dairy	No.	1.	100	cases,	or 48.5	per	cent.
"	"	2.	22	"	10.6	"	"
"	"	3.	15	"	7.3	"	"
"	"	4.	7	"	3.4	"	"
"	"	5.	6	"	2.9	"	"
"	"	6.	5	"	2.4	"	"
"	"	7.	4	"	1.9	"	"
"	"	8.	3	"	1.4	"	"
"	"	9.	3	"	1.4	"	"
"	"	10.	3	"	1.4	"	"
"	"	11.	3	"	1.4	"	"
"	"	12.	3	"	1.4	"	"
"	"	13.	3	"	1.4	"	"
"	"	14.	2	"	.9	"	"
"	"	15.	2	"	.9	"	"
"	"	16.	2	"	.9	"	"
"	"	17.	2	"	.9	"	"
"	"	18.	1	"	.4	"	"
"	"	19.	1	"	.4	"	"
"	"	20.	1	"	.4	"	"
"	"	21.	1	"	.4	"	"
"	"	22.	1	"	.4	"	"
"	"	23.	1	"	.4	"	"
"	"	24.	1	"	.4	"	"
"	"	25.	1	"	.4	"	"
"	"	26.	1	"	.4	"	"
"	"	27.	1	"	.4	"	"
"	"	28.	1	"	.4	"	"
"	"	29.	1	"	.4	"	"
"	"	30.	1	"	.4	"	"
"	"	31.	1	"	.4	"	"
"	"	32.	1	"	.4	"	"
"	"	33.	1	"	.4	"	"
"	"	34.	1	"	.4	"	"
"	"	35.	1	"	.4	"	"
"	"	36.	1	"	.4	"	"
"	"	37.	1	"	.4	"	"
"	"	38.	1	"	.4	"	"
			206 cases.				

Pasteurization and dates of cases occurring on different Dairy Routes.

No. 6. Five cases, Feb. 12, 14, 16 and 19	Definitely stated that milk was unpasteurized in all cases before that reported on February 19.
" 7. All unpasteurized. Four cases	Feb. 11, 2 cases. Feb. 12, 1 case. Between Feb. 12 and 18, one case.
" 15. Two cases	Pasteurization not stated. Exact date of sickness not stated.
" 17. Two cases from Feb. 10 to 26	Unpasteurized.

No. 11. Three cases, unpasteurized	Feb. 7 to 26th. One case between the 10th and 26th.
" 14. Two cases, unpasteurized	One case Feb. 13. One case Feb. 10.
" 10. Unpasteurized, 3 cases	Feb. 12 to 16th. One case, date unknown.
" 9. Three cases	One case between Feb. 10 and 20. One case Feb. 12. One case, time not stated. This milk was all probably pasteurized.
" 13. Three cases, unpasteurized	Feb. 12, 13, 14.
" 5. Six cases	Feb. 13, one case. Feb. 16, one case. Between Feb. 10 and 20, two cases. Time not stated, 2 cases. The milk supply of these cases was probably pasteurized.
" 16. Two cases, unpasteurized	Feb. 18, one case. One case, time not stated.
" 8. Three cases, unpasteurized	Feb. 10, one case. Feb. 13, one case. Not stated, one case.
" 4. Seven cases	Feb. 12, one case. Feb. 13, one case. Feb. 17, two cases. Feb. 20, one case. Time not stated, 2 cases. The milk taken by all the persons in this list was probably pasteurized.
" 2. Twenty-two cases	Feb. 10, 5 cases. Feb. 12, 5 cases. Feb. 13, 1 case. Feb. 14, 2 cases. Feb. 15, 1 case. Feb. 16, 2 cases (One had two sources of supply). Feb. 17, 2 cases. Time not stated, 4 cases. Milk probably pasteurized in 17 cases. Stated definitely to be unpasteurized, 5 cases.
" 3. Fifteen cases	General supply mostly pasteurized. Feb. 10, 2 cases. Feb. 12, 2 cases. Feb. 13, 2 cases. Feb. 15, 2 cases. Feb. 16, 1 case. Time not stated, 6 cases. Of these 15 cases, 14 were definitely stated to have unpasteurized milk.

No. 18. One case, unpasteurized, Feb. 12.
" 19. One case, unpasteurized, Feb. 12.
" 20. One case, unpasteurized, Feb. 13.
" 26. One case, unpasteurized, Feb. 17.
" 25. One case, Feb. 8, pasteurization unknown.
" 21. One case, unpasteurized, date unknown.
" 37. One case, unpasteurized, Feb. 16.
" 36. One case, unpasteurized, date not known.
" 35. One case, unpasteurized, between Feb. 12 and 17.
" 34. One case, unpasteurized, Feb. 17.
" 33. One case, unpasteurized, Feb. 14.
" 32. One case, unpasteurized, Feb. 12.
" 31. One case, pasteurized, Feb. 11.
" 30. One case, unpasteurized, date unknown.
" 29. One case, unpasteurized, Feb. 16.
" 28. One case, unpastuerized, Feb. 10.
" 27. One case, unpasteurized, Feb. 10.
" 24. One case, unpasteurized, Feb. 15.
" 23. One case, unpasteurized, Feb. 12.
" 22. One case, unpasteurized, Feb. 11.
" 38. One case, unpasteurized, Feb. 16.
" 1. One hundred cases.................This Dairy began pasteurizing all its milk from one source, the home source, Feb. 17. The other supply was not pasteurized until March 10th.

TONSILITIS OR SEPTIC SORE THROAT.

5 cases began on Feb. 7.
11 " " " Feb. 10.
6 " " " Feb. 11.
8 " " " Feb. 12.
2 " " " Feb. 13.
4 " " " Feb. 14.
5 " " " Feb. 15.
5 " " " Feb. 16.
1 " " " Feb. 17.
1 " " " Feb. 19.

48 cases

17 cases, date of first symptoms was not stated definitely.
71 cases or 71% of the 100 cases occurred between Feb. 10 and 18. They were all on unpasteurized milk.
58 cases, it was definitely known that the milk was from one source of supply.
2 cases from the other source of supply. The remainder undetermined. The great number it is safe to say, of these undetermined cases, were on the first source mentioned.
82 cases, or 82% in which tonsillitis occurred, were taking the milk unpasteurized. But two cases were definitely recorded as taking pasteurized milk.

From a glance at the rough table, it will be seen that of the 206 cases reported, 100 or 48.5% came from Dairy No. 1. Of these cases 82, or 82%

were using the milk Unpasteurized. Seventy-one of the cases occurred between February 10th and 18th.

The next largest number of cases occurred in those taking milk from Dairy No. 2. Twenty-two in number or 10.6%. Seventeen were probably on Pasteurized milk, five Unpasteurized. This supply is usually Pasteurized unless stated that the consumer wishes Unpasteurized or special milk.

The next largest number, Dairy No. 3, 15 cases, or 7.3%. This milk supply is, as a rule, Pasteurized. Out of the 15 cases occurring, all but one was stated to have Unpasteurized milk.

The next largest number, Dairy No. 4, 7 cases, or 3.4% were probably taking Pasteurized milk.

The next, No. 5, 6 cases, or 2.9%, the milk was probably Pasteurized.

The next, No. 6, 5 cases, or 2.4%, it was Unpasteurized. One case doubtful.

Next, No. 7, 4 cases, or 1.9%, all Unpasteurized.

Next, No. 8, 3 cases, or 1.4%, all Unpasteurized, and so on.

1.4%, .9% and .4% of the cases were scattered though many dairies.

Of these cases, 106 in number, the supply was found to be Pasteurized in 33 cases, Unpasteurized in 59 cases and 4 undetermined. Of the 21 dairies having one case each, none of the supply was Pasteurized.

1. It would seem from these statistics that there was an increase of the normal amount of tonsillitis usually present in February in Boston.

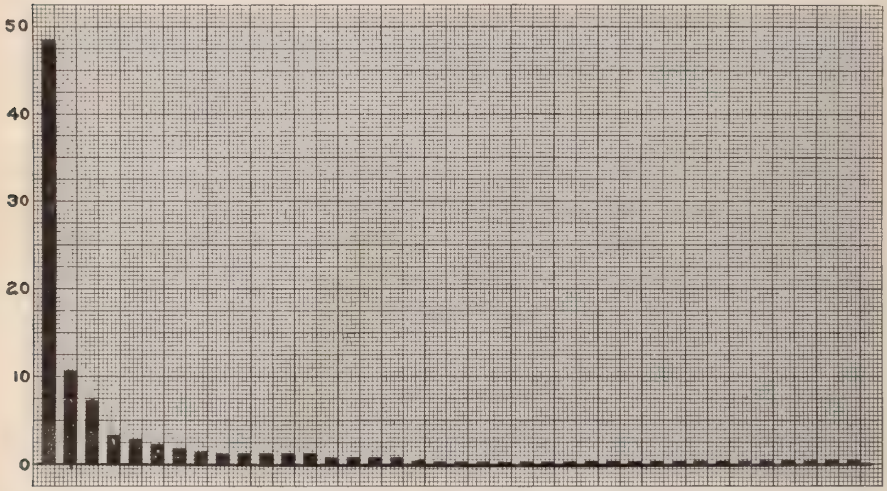
2. A distinct epidemic occurring, for the most part, in those on one milk supply, presumably due to infection of the supply at sometime about February 10, 1912.

Report of Visit to Plant No. 1.

The first visit was to the receiving station. Here the throats of sixteen men were examined clinically and swabs taken from nose and throat which were turned over to Dr. Arms for examination. All the men showed markedly reddened throats, a number with minute vesicles on the soft palate. One man in the bottling room had a few discreet follicles or plugs on the right tonsil. Examination of the hands was negative in every instance for desquamation or wounds or suppurated places, except in one instance where a capper had wounds protected on his hands.

In watching the bottlers at work it was repeatedly observed that actual hand contact with the milk was at times possible.

The next visit was to the farm proper. Here ten farm hands were examined. The description of each throat in the receiving station and farm will be found in the enclosed report. All the men at the farm had reddened throats though not nearly so marked in some instances as those at the receiving station. No case of desquamation of hands was seen. The men in the receiving room are occupied largely in damp places handling the milk on concrete floors. This circumstance, exposure to damp, probably has much to do with the pharyngitis which seemed to be universally present. The men on the farm are occupied an hour or so in very dusty lofts each day, getting feed. This may have an important bearing on the throat conditions in some cases. Three of the farm hands, who, I think I am right in saying, were milkers or milked at times, could speak no English. It seems difficult to understand how these men could be made to appreciate the fact of the importance of clean milk, though the records of the counts of the milk show that they must be careful and cleanly milkers, certainly in most cases.



Dairy No.	Per cent. of Cases
1	48.5
2	10.6
3	7.3
4	3.4
5	2.9
6	2.4
7	1.9
8	1.4
9	1.4
10	1.4
11	1.4
12	1.4
13	1.4
14	.9
15	.9
16	.9
17	.9
18	.4
19	.4
20	.4
21	.4
22	.4
23	.4
24	.4
25	.4
26	.4
27	.4
28	.4
29	.4
30	.4
31	.4
32	.4
33	.4
34	.4
35	.4
36	.4
37	.4
38	.4

To sum up, 26 men were examined. Swabs from the nose and throat of these men were sent to Dr. Arms and carefully examined clinically. No case of desquamation of the hands or other lesion was found.

In looking for possible sources of trouble from the milk supply,—from statistics gathered from the reports sent in to the Board of Health,—there seemed to be two sources of possible transmission of infection.

(1). In the possibility of direct contact with the operators' hands when the bottling of the milk was observed by me from the glass windows over the room. If the operator had a septic throat infection the milk supplying some bottles could be easily contaminated, and if this milk was sent out Unpasteurized, trouble could easily follow.

(2). The milkers' hands. The milk counts and general cleanliness of the milk is well known. At the same time, three of them apparently knew no word of English. It seems as though it would be difficult for such men to always realize the very great importance of the strict rules for milking which are undoubtedly given there. Not one of the men examined had a clinically normal throat. In the receiving station severe pharyngitis, dark red throats the color of raw beef, without exudate, was the rule. Generally without symptom. The constant exposure to the dampness may have something to do with this. The condition is of great interest in relation to the susceptibility of individuals with such throats to a virulent infection. All vesicles on the soft palate, which were quite common, were of interest. The oedema of the uvula, which was too constant to be without interest, was seen more in the men in the receiving station than at the farm. One of these men who was occupied in loading and general work had an acute sore throat around February 9–10, 1912. One of the men, who is a general man, had a beefy red throat and oedema of the uvula. He had an acute sore throat around May 1, 1911. Another of the men occupied in the butter room, had a beefy red throat and oedema of the uvula and said he had an acute sore throat about two day ago.

SWABS FROM PLANT NO. 1.

Receiving Station.

No.	1.	Dumping milk	Slightly reddened throat. Vesicles on palate.
"	2.	Washing cans	Chronic pharyngitis. Reddened throat.
"	3.	Superintendent	Slightly reddened throat.
"	4.	Butter maker	Reddened throat.
"	5.	Capping machine	Chronic reddened throat. Exudate on right tonsil.
"	6.	Capping machine	Reddened throat. Vesicles on pharynx.
"	7.	Filling machine	Reddened throat.
"	8.	Pasteurizing room	Diffusely reddened throat.
"	9.	General room, handling capped bottles	Slight redness.
"	10.	Loading and general work	Red with oedematous uvula. Sore throat around Feb. 9, and 10, 1912.
"	11.	Testing and general work	Reddened throat. Chronic Tonsils. Oedematous uvula.
"	12.	Shipper of cream	Reddened throat. Oedematous uvula. Vesicles on pharynx.
"	13.	General room, handles capped bottles	Sore throat two weeks. Diffusely reddened throat. Oedematous uvula.

No. 14.	General man	Beefy red throat. Oedematous uvula. Sore throat May 1, 1911.
" 15.	Butter room	Beefy red throat. Oedematous uvula. Sore throat two days ago.
" 16.	Collects samples	Beefy red throat. Vesicle.

FARM HANDS.

No. 17.	Milker and general washer	Very slight redness.
" 18.	Herdsman	Very slight redness.
" 19.	Carries jugs of milk to milk room	Very red throat. Vesicles.
" 20.	Milker	Enlarged tonsils, small white spot on rights tonsil. Diffusely red.
" 21.	Milker	Chronic tonsils. Reddened throat.
"" 22.	Milker	Oedematous uvula. Chronic red throat, (one swab touched outer part of glass tube.)
" 23.	Milker	Very red throat. Oedematous uvula.
" 24.	Milker	Slight redness.
" 25.	General help, some milking	Chronic pharyngitis. Diffused redness.
" 26.	Milker	Chronic pharyngitis. Vesicles on pharynx.

Dr. Arm's report on the cultures from the employees of Plant No. 1, 26 in number, together with 27 which were obtained from different sources as controls. The report is divided in three classes, those showing many streptococci, those showing a few and those with none.

	Many	Few	None	Total.
Plant No. 1.	4	13	9	26
Controls.	8	17	2	27

The controls were obtained from the following sources:

M. I. T.	6	6	1	13
Milk Lab'y	0	5	0	5
Bact. Lab'y	2	6	1	9

Considering the number of cases of markedly reddened throats found in the clinical examination of this Plant, it was thought of great interest to visit other Plants to ascertain the clinical condition of the throat and take swabs. This was done in three large Plants which were visited.

PLANT NO. 2.

No. 1.	Handles cream	Faintest possible redness.
" 2.	Taster	Very slight redness.
" 3.	Butter maker	Considerable reddened throat. Vesicles on pharynx.

No. 4.	Cream taster	Very slight redness.
“ 5.	Cream taster	Very slight redness. Chronic pharyngitis.
“ 6.	Taster	“ “ “ “ “
“ 7.	Taster	Considerable redness. Oedematous uvula.
“ 8.	Foreman bottling	Slight chronic pharyngitis.
“ 9.	Bottler	Considerable redness. Vesicles on pharynx.
“ 10.	Taster	Very slight redness.
“ 11.	Filler	Considerable redness.
“ 12.	Filler	“ “
“ 13.	Filler	Very red throat, oedematous uvula.
“ 14.	Handles bottles	Normal except enlarged tonsils.
“ 15.	Filler	Very slight redness.
“ 16.	Filler	Slight redness. Very enlarged tonsils.

PLANT NO. 9.

No. 17.	Handles cream	Reddened throat. Oedematous uvula.
“ 18.	Can carrier	Reddened throat.
“ 19.	Has charge of testing	Chronic tonsils. Oedematous uvula, reddened throat.
“ 20.	Can carrier	Chronic tonsils. Oedematous uvula, reddened throat.
“ 21.	Taster	Very oedmatous uvula, considerably reddened throat.
“ 22.	General work	Oedematous uvula, reddened throat.
“ 23.	Inspects bottles	“ “ “ “
“ 24.	Bottle washer	“ “ “ “
“ 25.	Counts cases	“ “ “ “ Chronic tonsils.
“ 26.	Bottles milk	Oedematous uvula, reddened throat, chronic tonsils.
“ 27.	Bottles milk	Oedematous uvula, chronic tonsils.
“ 28.	Counts cans	Reddened throat.
“ 29.	Washes cans	Oedematous uvula, reddened throat.
“ 30.	Butter maker	“ “ “ “ Vesicles on pharynx.
“ 31.	Butter handler	Oedematous uvula, marked vesicles on pharynx.
“ 32.	Loading cans	Chronic pharyngitis.
“ 33.	Has charge of bottling	Extremely reddened throat.

PLANT NO. 5.

No. 34.	Inspector of capping bottles	Oedematous uvula, reddened throat.
“ 35.	Inspector of capping bottles	Septic finger.
“ 36.	Foreman milk room	Reddened throat, oedematous uvula.
“ 37.	Bottle filler	Very slight redness.
“ 38.	Bottling machine	Oedematous uvula, reddened pharynx.
“ 39.	Cream handler	“ “ reddened throat.
“ 40	Dumps milk and cream	“ “ “ “
“ 41.	Inspector of bottles	“ “ “ “ vesicles on pharynx.

No. 42.	Empties bottles	Oedematous uvula, very red throat, vesicles on pharynx.
" 43.	Inspects bottles	Oedematous uvula, reddened throat, vesicles on pharnyx.
" 44.	Bottles milk	Oedematous uvula, reddened throat, vesicles on pharynx.
" 45.	Handles empty bottles	Oedematous uvula, reddened throat.
" 46.	Handles empty bottles	" " " "
" 47.	Handles bottles	" " " " Chronic pharyngitis.
" 48.	Inspects empty bottles	Oedematous uvula (very large) reddened throat. Chronic pharyngitis.
" 49.	Inspects empty bottles	Very red oedematous uvula, chronic pharyngitis.
" 50.	Handles bottled milk in chest	Oedematous uvula, reddened throat.
" 51.	Spare wagon driver	" " " "
" 52.	Wagon driver	Very large tonsils, slight redness.

Broth Cultures for Streptococci

		April 23, 1912.
	Plant No. 2.	
No. 5.	"	Negative
" 11.	"	"
" 16.	"	"
" 7.	"	Few
" 3.	"	"
" 15.	"	"
" 8.	"	"
" 6.	"	"
" 13.	"	"
" 10.	"	"
" 1.	"	"
" 2.	"	"
" 4.	"	"
" 9.	"	Many
" 12.	"	"
" 14.	"	Practically Pure Culture.
	Plant No. 9.	
No. 25.	"	Negative
" 21.	"	"
" 17.	"	"
" 20.	"	Few
" 28.	"	"
" 30.	"	"
" 32.	"	"
" 33.	"	"
" 18.	"	Many
" 24.	"	"
" 27.	"	"

No. 26.	Plant No. 9.	Many
“ 19.	“	“
“ 31.	“	“
“ 23.	“	Practically Pure Culture.
“ 22.	“	“
“ 29.	“	“
	Plant No. 5.	
No. 49.	“	Negative
“ 39.	“	Few
“ 50.	“	“
“ 40.	“	“
“ 52.	“	“
“ 44.	“	“
“ 36.	“	“
“ 41.	“	“
“ 43.	“	“
“ 38.	“	“
“ 47.	“	“
“ 34.	“	“
“ 48.	“	“
“ 37.	“	“
“ 35.	“	Many
“ 42.	“	“
“ 45.	“	“
“ 46.	“	“
“ 51.	“	“

In Plants Nos. 2, 5 and 9, where this examination was made, very many reddened throats were found. In all four Plants examined, 77 employees were examined not one had a clinically normal throat. The throats of 17 of the officers and employees of the Board of Health were examined clinically. Of these a considerable number showed a slight redness, two showed considerable redness and one an intensely reddened throat. Only one showed a condition which clinically was at all like the severe grades of pharyngitis with intense redness so common among the milk handlers. These men are working long hours on damp and wet floors often covered with milk and ice and I attribute this extreme degree of chronic pharyngitis to that cause. Many of them when questioned about their throats said that there was absolutely no trouble.

The report of the cultures and the swabs from the last three Plants is as follows:

Plant No. 2, 16 men. Three showed no streptococci, 10, few streptococci, 2, many streptococci and one practically pure culture of streptococci.

Plant No. 9, 17 men. Three showed no streptococci, 5, few streptococci, 6, many streptococci and three practically pure culture of streptococci.

Plant No. 5, 19 men. One showed no streptococci, 13 few streptococci, 5 many streptococci.

It is of interest that one of the cultures was from an unprotected paronychia on the thumb. This last case showed many streptococci. This man was occupied capping bottles and had also an oedematous uvula and reddened throat. Taking all the 77 employees examined in the different plants it was found that 51 or 66.2% showed streptococci in the culture from the nose and throat. Four or 5.1% showed practically pure culture of streptococci from plants 2, 9 and 5.

GENERAL CONCLUSIONS FROM THESE STATISTICS.

The occurrence of so many cases of marked pharyngitis, with or without symptoms, in dairymen and those handling milk is of great interest. The presence of streptococci in so many of these throats with clinical symptoms of inflammation is also of interest. The question arising from their presence, especially from those engaged in handling milk, is, are they virulent? And if so, are they transmitted by carriers, to a milk supply, which is sent out unpasteurized? I conclude that the mere presence of streptococci in these throats may mean much or little. Without virulence tests, their presence cannot be considered necessarily of importance. It seems fair to state from the clinical examination of 77 cases that there is a condition which might be termed dairymen's or milk handler's pharyngitis, incident to the long hours of constant work on the wet floors often covered with ice and milk. It does not seem as if all the scrupulous care and pains taken in the efforts in producing the cleanest possible milk could be unvaryingly successful in an unpasteurized product. It would seem as if direct or nearly direct hand contact with the milk is impossible to avoid in some stage of the preparation. Pasteurization by unit system of small packages (one sealed bottle) seems an ideal method.

I wish to express my appreciation of the unfailing courtesy and help of the managers and proprietors of the different milk plants who allowed me to make these examinations for the Board of Health.

TYPHOID FEVER IN NEW YORK CITY TOGETHER WITH A DISCUSSION OF THE METHODS FOUND SERVICEABLE IN STUDYING ITS OCCURRENCE

(Continued.)

CHARLES F. BOLDUAN, M. D.,
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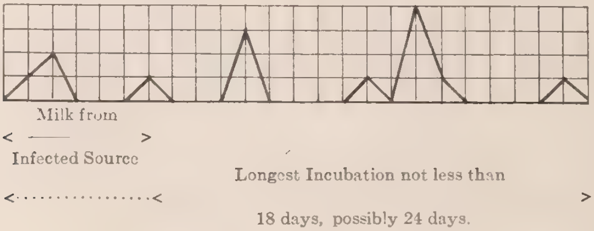
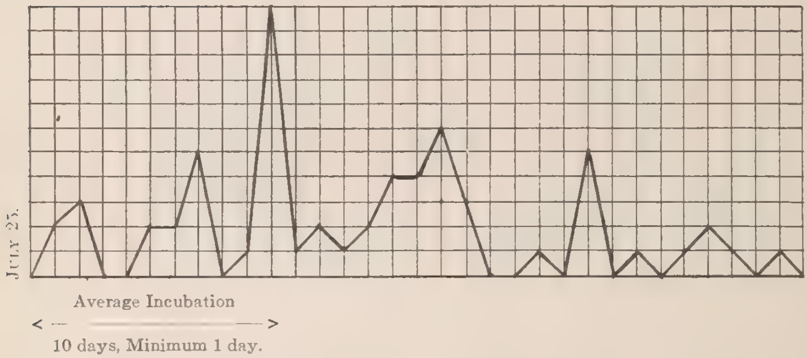
THE STUDY OF THE DATA OBTAINED.

The main value of exact knowledge concerning the dates of onset, and the occurrence of single or multiple infections is in the light these facts throw on the time infection occurred. There is still considerable difference of opinion concerning the average duration of the period of incubation. As in other infections, the period of incubation varies with the size of the dose, the virulence of the infecting organism, and the resistance of the infected individual. There is reason, therefore, for holding that milk infections will, in general, have a shorter incubation than water-borne infections, because with milk constituting such an excellent medium for the growth of the typhoid bacillus it is natural to believe that the number of bacilli introduced will be greater in milk-borne infections. The shortest incubations I have observed was in the case of a milk infection. It is not often possible that the date of infection, and thus the period of incubation, can be accurately established, so that the following occurrence may be of interest:

In a recent milk-borne outbreak of typhoid fever in this city, milk from the creamery to which the infection was finally traced was first shipped to the affected district on July 25th, and, so far as part of the cases is concerned, was not shipped after July 31st. Since the first case (in an institution for children) developed on July 27th, we must assume that the first shipment, that of July 25th, was infected. As this milk was consumed on the morning of the 26th, we have here an incubation of about one day. From the following curve of the onsets, it is difficult to determine whether infection occurred but once or was repeated. It is certain, by examining the second curve in which are shown those cases in which the milk from this particular creamery was received only for the six days from July 26th, to August 1st, that the maximum incubation period cannot have been less than eighteen days, and may have been as long as twenty-four days.





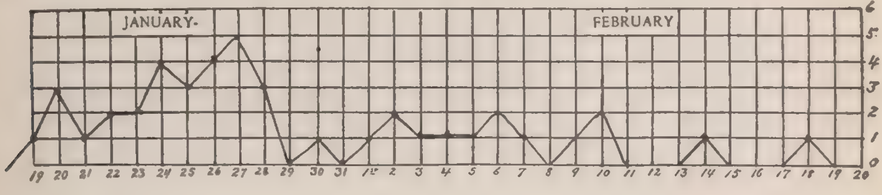
In addition to these uses of a tabulation of dates of onset, there is another which occasionally proves of great value. In tracing an infection, for example, to a certain milk supply, and thence back into the country, one may find that there is considerable typhoid fever in the district from which the milk is drawn. A comparison of the dates of onset of the two sets of cases at once shows whether one can make the country cases responsible for the city cases, or whether both must be traced to a common source. It is very unlikely that the two sets of cases are unconnected in some way.

This use of such tabulations is illustrated in the following:

Water-borne outbreak of typhoid fever due to infected Croton water; a group of cases in the watershed, with onsets coinciding with those of the city cases. Croton water the only factor common to both groups. All the cases, therefore, due to a common cause, as was finally established with a reasonable degree of certainty.

Week ending	Cases of Typhoid Fever in Manhattan and Bronx 1907 Arranged by Onsets*		Onsets of the Watershed Cases for Comparison
		Normalized Average	
Jan. 5	19	21	
12	25	21	
19	20	19	
26	45	13	
Feb. 2	31	17	1 case
9	35	18	
16	27	17	
23	33	14	1 case
March 2	40	17	5 cases
9	85	15	1 case
16	107	12	2 cases
23	31	15	
30	68	15	
April 6	87	12	
13	78	15	
20	64	17	

Milk-borne outbreak of typhoid fever; a group of six cases in the village from which the milk came. Dates of onset of village cases coincide with those of the city cases. All finally traced to a chronic bacillus carrier.



The onsets of the village cases were:

January 20th — one case.
January 24th — one case.
February 1st — three cases.
February 7th — one case.

A tabulation of the age groupings should also be made of all the cases probably belonging to the outbreak being investigated. This frequently aids in deciding on the probable medium of transmission. In milk-borne outbreaks the proportion of children affected is relatively greater than in water-borne outbreaks. Naturally, one must take into consideration the age grouping of the entire population from which the cases are drawn. Thus an age grouping of the cases occurring among the soldiers would have absolutely no value for the purpose mentioned. Similarly, in an outbreak in an institution for children it is a waste of time to make such an age grouping. But if the cases occur in an ordinary mixed population, such an age grouping of cases affected often gives valuable information. The following is an example of the difference between the two kinds of outbreaks:

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* These figures are merely the reported cases moved back 2 weeks.

	Under 5	5–9	10–14	15–19	20–29	30–39	40 and over	Total
Milk-borne Outbreak.								
N. Y. Feb., 1910	3	7	5	6	14	4	3	42
N Y., July 1911	1	14	17	8	33	19	7	99
Bronx, Aug., 1911	3	3	7	2	4	2	2	23
For Comparison								
All cases, N. Y., 1907	36	82	255		347	180	100	1 000

It goes almost without saying that for the purpose of study one will undertake a number of tentative tabulations of various kinds, and then when the cause of the outbreak is definitely fixed, make final tabulations embracing only the cases known to belong to the outbreak in question.

The main object of several of the tabulations here outlined is to discover as promptly as possible any unusual occurrence of typhoid fever in the city to the end that the necessary steps may at once be taken to check the outbreak. It is to be regretted that we have to speak of any "normal" occurrence of typhoid fever, but while the statement is often made that typhoid fever is a filth disease whose occurrence indicates neglect of proper precautions, all who have studied the disease carefully take a much more charitable view of the situation. For this reason the studies here outlined concern themselves with an abnormal occurrence of typhoid fever, leaving for future study the problem of entirely eradicating the disease.

While it is obviously impossible to describe in detail all the steps to be taken in the investigation of the source and mode of transmission of this infection, I hope in the following to outline some of the more important considerations which should guide the investigator.

PURELY LOCAL CAUSES.

If the tabulation of the ward returns shows the increased number of cases to be limited to a single ward, and especially if the map shows that the cases are confined to a very small territory, it is well to hunt first for a purely local cause, such as infection from a milk shop, an infected well (if in the suburbs), out-door privies, vacant lots littered with rubbish, garbage and fecal deposits, from which infection could be spread by fly transmission.

If several of the cases get their milk from the same milk shop the most searching inquiry must be made concerning any febrile disease which might have been typhoid fever, in any one handling the milk or even merely in the household. It is well to inquire first merely concerning *any* illness; who the family physician is; when he attended the family; what ailment. It is important to go into the history of any illness that lasted a week or more or that confined the patient to bed. Cases of typhoid fever are sometimes diagnosed as malaria, or intermittent fever, or slow fever, or grip. The investigator must try to satisfy himself that no typhoid history has escaped him. The fact that jaundice and also gallstones are in some instances associated with a previous typhoid infection must not be overlooked. I once saw an epidemic of water-borne typhoid fever* embracing, perhaps, one hundred cases in which about twenty per cent. of the patients had marked icterus. A number of typhoid bacillus carriers reported in the literature have been sufferers from gallstones. If it is impossible to discover any trace of typhoid infection about the home or among the help of the shopkeeper the inquiry must be extended to the other occupants of the house in which the store is located. Inquiries concerning the occurrence of a possible typhoid infection in the immediate neighborhood must also be made.

If the cases are practically all in one house, there is a possibility of a tank of water on the roof being infected;† or the patients may all have gone to the same ice cream store, or they may have been infected from a previous mild and, therefore, unrecognized case. The possibilities are many and it is well to listen to the clues suggested by the neighbors as now and then they prove correct.

MILK DATA.

In the successful investigation of milk-borne outbreaks of typhoid fever, in a large city certain features of the administrative control of the milk supply are practically indispensable. There must be some system of recording at all times where a given supply of milk sold in the city is shipped from. While, undoubtedly, this can be accomplished in a number of different ways, I shall here describe the method which has been gradually developed in New York City and which in the main has worked satisfactorily.

No milk may be sold in New York City except under a permit in writing from the Department of Health. Compliance with all the rules and regulations is one of the prime conditions governing the granting of such a permit, and the permit may be removed for cause. It is hardly necessary to say that a permit is only issued after the Department has satisfied itself that the conditions surrounding the sale and keeping of the milk are sanitary. Moreover, every case of infectious disease occurring in the family or household of the storekeeper holding a permit to sell milk must at once be reported to the Department, whereupon an inspection is at once made to make certain that the patient is properly quarantined and the milk supply in no way endangered. The companies shipping milk into the city, who are themselves under control of the Department of Health, are compelled to tag each can of milk with a tag showing the creamery (shipping station) from which the milk was shipped and the date of shipment.

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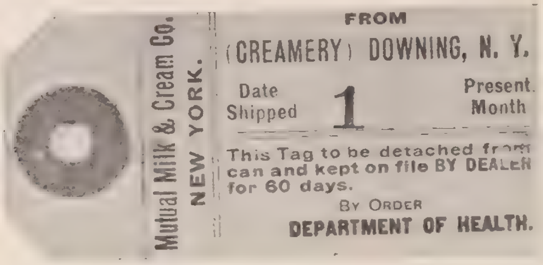
* Typical typhoid bacilli isolated from the stools.

† This was the cause of a small group of cases studied some years ago by Park, and due to infection with paratyphoid bacilli.



Mutual Milk & Cream Co.
NEW YORK.

FROM
(CREAMERY) DOWNING, N. Y.

Date Shipped 1 Present Month

This Tag to be detached from can and kept on file BY DEALER for 60 days.

BY ORDER
DEPARTMENT OF HEALTH.

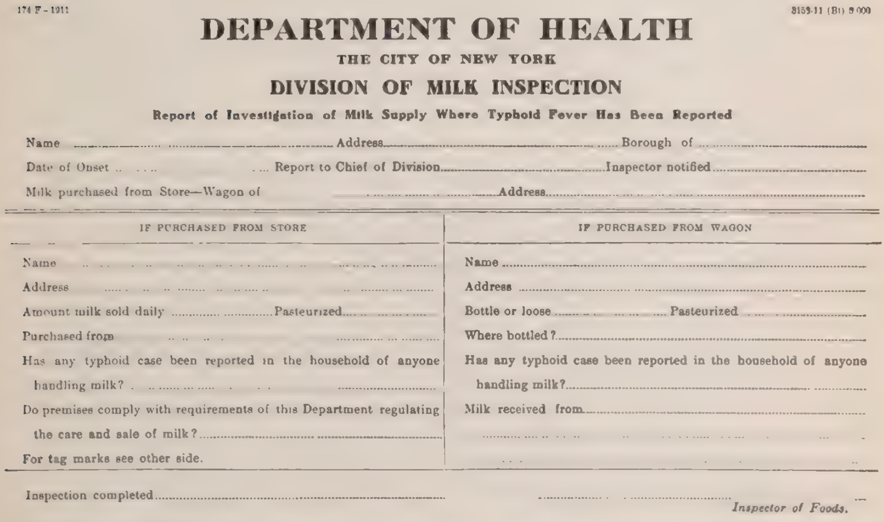
NOTE: In place of the date "1...Present Month" as shown on this tag, the Department of Health now requires the full date, thus "July 1, 1912."

In addition to this, they are required to keep a record of the distribution of this milk to the various retailers. In the case of bottled milk each bottle cap must bear the name of the creamery or bottling plant together with the date. The company must also have accurate records to show, in the case of country bottled milk, on what wagons and routes the milk of the various creameries was distributed. The retail dealer is compelled to save these tags for sixty days: *i. e.*, he must always have on hand the tags for the last sixty days. In tracing out a milk-borne outbreak of typhoid fever, therefore, it is a simple matter to determine from which creameries milk sold at any given store or stores for the three weeks prior to the onset of the cases, was shipped from.

As soon as the inspector has visited the cases of typhoid fever and has filled out the report card already described, he visits the milk dealer whose supply was used and ascertains from him the wholesaler for this milk, and, in the case of "dipped milk," the creamery tags for each of twenty-one-days prior to the onset of the typhoid infection. For this purpose he has a separate "Milk Supply Card" shown herewith.

If the patient secured milk from several stores a separate card is filled out for each store. In the case of bottled milk, since the caps are not saved by the consumer, it is obviously impossible to secure the name of the creamery; this must be traced differently, as will be shown in a moment. From the information secured on these "milk cards" is at once made the typhoid record already referred to, in which each case of typhoid fever is entered against the milk dealer supplying the same. It is important to understand clearly that this in no way implies that the milk caused the infection; the tabulation is made for the purpose of discovering the occurrence of any unusual number of cases of typhoid fever among the customers of a given milk dealer. As soon as an apparent increase is noted a special investigation is undertaken to discover whether this milk was the responsible factor. The tabulation sheet, it will be noted, shows, after the dealer's name, the approximate daily sales, in quarts, and also shows whether the milk was pasteurized or raw.

(CARD)



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DEPARTMENT OF HEALTH

THE CITY OF NEW YORK

DIVISION OF MILK INSPECTION

Report of Investigation of Milk Supply Where Typhoid Fever Has Been Reported

Name .... Address .... Borough of ....

Date of Onset .... Report to Chief of Division .... Inspector notified ....

Milk purchased from Store—Wagon of .... Address ....

IF PURCHASED FROM STORE	IF PURCHASED FROM WAGON
Name	Name ....
Address	Address ....
Amount milk sold daily .... Pasteurized	Bottle or loose .... Pasteurized ....
Purchased from	Where bottled? ....
Has any typhoid case been reported in the household of anyone handling milk?	Has any typhoid case been reported in the household of anyone handling milk? ....
Do premises comply with requirements of this Department regulating the care and sale of milk?	Milk received from ....
For tag marks see other side.	

Inspection completed ....

.... *Inspector of Foods.*

On the back of this Card there is space for a list of the shipping points, as shown by the tags, that have supplied milk to the supply three weeks prior to the onset of the disease and a record of any Typhoid at the Creameries is noted.

PROBABLE LOCATION OF THE INFECTION.

If the tabulation of the cases charged against each milk dealer (wholesaler) indicates that any particular one is running high, the first point to determine is as to the kind of milk used by the various patients charged against this milk. Was it raw or pasteurized? Dipped or bottled? Shipped direct from the country or filled into bottles or cans in some central creamery in the city? By studying these questions we determine whether to look for the cause of infection in the city or in the country. If the milk is efficiently pasteurized in some central plant in the city, it is idle to investigate creameries and dairies in the country for the source of infection. Moreover, if the cases appear to be limited to the customers of some small retail dealer leaving unaffected the customers of other dealers supplied with exactly the same milk, it is very probable that a local cause is at the bottom of the infections.

INFECTION TRACED TO THE COUNTRY.

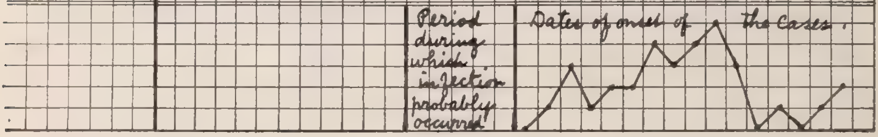
If the preliminary orientations indicate that the infection resulted in the country, steps must at once be taken to discover where the infection is located. In the case of "dipped" milk received by the retail dealer in cans as shipped from the country, we make use of a simple tabulation of the names of the creameries as found on the tags kept in the milk shop supplying the patient during the three weeks prior to the onset of the disease. In the case of country bottled milk a record of all the creameries shipping to the depot from which the infected supply was distributed is obtained from the company. This is arranged somewhat as follows:

Creameries Shipping Milk to the Affected District, New York City, Outbreak January, '10.
Creameries shipping Milk to the affected district through the large company whose supply was evidently involved.

+ = Milk shipped that day.
O = No milk shipped that day.

JANUARY

	Creamery	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3
1	P-------y	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+						
2	H.A----e	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+						
3	W------l	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+						
4	G------t	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+						
5	G------e	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+						
6	W--------r	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	+	+	0	0	0	0	0	0	0	0	0	0						
7	Fr. P------s	0	0	+	+	+	+	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
8	D-K..J---n	0	0	0	0	0	0	0	0	0	0	0	0	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0	0						
9	G------c	0	0	0	0	0	0	0	0	0	0	0	0	0	+	+	+	+	+	+	+	0	0	0	0	0	0	0	0						
10	S------s	0	0	0	0	+	0	0	0	0	0	0	0	+	0	+	0	0	0	0	+	+	+	0	0	0	+	0	0						



The two tabulations may also be used to advantage together, but only, of course, in the case of loose, *i. e.*, dipped milk, as there are no tags to bottled milk.

Attention is naurally paid first to the creamery suggested by these tabulations, but if no sufficient clue be obtained at this creamery the others must also be carefully investigated. It is well to assign several inspectors to this work in order to discover and remove the source of infection as quickly as possible.

The preceding tabulation has been introduced particularly because it shows how appearances may mislead, if one relies too much on devices whose only object is to *suggest* clues. It will be seen by glancing at the curve of onsets that the infected milk probably came into the city some time between the 13th, and 18th of January, and it was natural to think that this showed the infection to have been carried in from one of the last three creameries on the list. Number six was also suspected, but inasmuch as it had shipped regularly until the 8th of January, appeared less likely as a source of infection. Despite these rather marked indications, it was conclusively established that Creamery No. 1 on the list was the one from which the infection was carried. Yet this creamery had been shipping regularly to the same district in the city for several years.

THE HEALTH CONDITIONS IN THE TOWN WHERE THE CREAMERY IS LOCATED.

Arrived at the town where the creamery is located the first inquiry to be made is as to the occurrence of typhoid fever in the town or country roundabout. The manager of the creamery is generally in touch with the local physicians and may have knowledge of such infections. The local health officer must also be questioned. It often happens that cases of typhoid fever occur without being reported to the health officer, and it is well, therefore, to visit all the physicians and also make inquiries of the hotel proprietor. At the livery where the team is hired to take the investigator to the various farms one can sometimes pick up valuable clues.

If any typhoid infections have occurred recently in the village or surrounding country careful inquiries must be made to determine whether they have any connection with the infection of milk sent to the city. The plan of such an inquiry is the same as that already discussed and embraces data as to age, date of onset, milk and water supply, other causes, etc. The important point to determine is whether the case or cases in the village originated from the creamery infection, or from the same source as that, or whether the village case brought infection into the creamery. I have elsewhere [*] called attention to the interesting milk-borne outbreak in this City in which a group of cases developed at the same time in the village where the creamery was located. In this instance all the cases were finally traced to the same cause, a chronic bacillus carrier.

In tracing another milk-borne outbreak,[†] which also proved to be due to a bacillus carrier, I incidentally was able to explain the undue prevalence of typhoid fever in the village during the past twenty-five or thirty years. The carrier whom I there discovered was one of the local milk dealers, sharing the business of the village about equally with two others. On looking back over the typhoid fever cases in the village, numbering from fifteen to twenty annually in a population of 2500, it was found that by far the greater number had been users of this dairyman's milk.

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[*] New York Medical Journal, December 30, 1911.

[†] Journal of American Medical Association, Jan. 6, 1912.

THE CREAMERY.

The regulations of the Department of Health require all creameries shipping milk into New York City to keep on file a weekly report of the occurrence of infectious diseases on each dairy supplying milk to that creamery. It goes without saying that the notification of such a disease is followed by the immediate adoption of precautions to avoid infection by the temporary exclusion of the dairy's milk. As soon as it is ascertained that the precautions taken are entirely sufficient to safeguard the milk supply from that dairy, it may again be received at the creamery. In seeking for a cause of typhoid infection, therefore, the inspector examines first of all the reports concerning the recent occurrence of infectious diseases. Note should be made of *any* infectious disease, even for example, of pneumonia, for it now and then happens that the diagnosis of the attending physician is far from correct.

It is well to examine the list showing the amount of milk brought to the creamery by each farmer each day. Obviously any sudden increase in the amount brought must be looked into. If it corresponds to the time of calving on the farm it has no particular significance; but, if not, it may indicate that the farmer is surreptitiously bringing along the milk from a neighboring farmer whose supply has been shut out. Moreover, even if the neighbor's supply had not been shut out, it is against the rules to bring milk from a farm not regularly entered at the creamery as supplying milk and certified to as meeting the requirements of the Department of Health.

Next a careful sanitary survey should be made of the creamery and its surroundings, in order to discover, if possible, whether infection could have been carried from an exposed privy, from a near-by open sewer, or from fecal deposits elsewhere near the creamery. The water supply must be looked into. The prevalence of flies and the existence of a near-by stable are to be noted. The condition of the receiving room, and the manner of handling the milk demand careful consideration. The workers in the creamery should each be very closely questioned as to a possible typhoid infection in the past. Inquiry must be made concerning any changes in the personnel within recent months, or the employment of additional help either during a rush period or in place of some one temporarily absent. Any absence, of course, is to be investigated. There are so many possibilities that it is useless to send anyone but a trained investigator to do this work.

If the creamery bottles its milk it is well to examine carefully just how the bottles are cleaned and how they are sterilized. It is conceivable that a bottle of milk supplied to a typhoid fever patient in the city becomes infected there and when returned to the creamery in the country if not properly sterilized carries infection into the creamery. It is obvious that such a chain of events is practically impossible to trace and, personally, I have not encountered an instance where such an infection seemed at all likely. What appears to be an authentic instance of this mode of infection is reported by Whipple and concerns an outbreak of typhoid fever in Montclair, N. J., some years ago.

The total amount of milk shipped from the creamery should be ascertained and inquiry made as to the destination of the same. Some creameries may ship part of their milk to one city and part to another. If the milk is infected one would look for typhoid infection in both. Nevertheless the absence of infection in the second city does not necessarily preclude infection of the milk at the creamery. Most creameries receive their milk in large vats directly it has been weighed, and from this vat it is strained and filled either into cans or bottles. It is perfectly possible for the milk received first to have been all weighed, strained, and bottled (or canned) before the milk coming from the infected farm reaches the receiving room. Only in this way is it possible to explain why typhoid infection sometimes does not follow the entire output of a given creamery in its distribution in the city.

THE DAIRIES.

Investigations at the creamery may have given so direct a clue to the dairy infected that this will at once be visited. However, if no such clue is encountered, every dairy supplying milk to that creamery must be visited. After a sanitary study has been made of the water supply, the location of the privy, the location and condition of the spring house, the conditions about the cow stable, and especially the conditions surrounding the handling of the milk, attention should be directed to the medical history of all the persons on the dairy farm. As already pointed out in discussing the medical histories of those having milk shops in the city, every illness that may possibly have been typhoid fever must be inquired into.

The inquiry must go back through the entire lifetime of each individual. I have traced a milk-borne outbreak of typhoid fever to a chronic bacillus carrier who had his typhoid infection forty-six years previously while a lad out West. The previous occurrence of typhoid fever on the dairy farm even if not in any member of the present occupants may have some bearing; for it is possible that the disposal of the stools at that time was such as to account for infection at the present time. Sometimes the source of infection is found in a neighboring farm. In the case of the typhoid carrier just mentioned this was the case. He was the local milk dealer for the village and did not ship to the creamery. His son-in-law, also a dairyman, lived a short distance down the road, on the way to the creamery and shipped all his milk to the creamery. In the family of the father-in-law there had been typhoid fever many times during the past thirty years, the last case having occurred just before I visited the town in order to trace the cause of the milk-borne outbreak in the city. The connection between the cases was due to the fact that when the father-in-law returned from his round in the village, he took what milk he had left over, to his son-in-law. The latter mixed it with what he took to the creamery and gave his father-in-law credit each day for the amounts received.

The water supply of the farm demands special attention. If it comes from a well, the nearness to the privy and cesspool are important. The frequency with which the former is cleaned out will give a clue as to whether it is a tight or leaching cesspool; if the privy appears tight the same information will prove useful. Specimens of the water should be collected both for chemical and bacteriological examination. If the water comes from a spring, one should bear in mind that these occasionally fail in dry seasons. Inquiries must be made concerning this and what supply was used when the spring gave out.

The method of cleaning the cans and milk utensils may yield a clue, especially how and where they are drained. Frequently this offers every possible opportunity for flies to infect the utensils from a near-by privy.

In case any one connected with the dairy gives a history of having had an infection which might have been typhoid fever, it is important to secure specimens of urine and stools for bacteriological examinaton. A drop of blood for the Widal test is also desirable. The examination of these specimens is described at the end of this article.

WATER INFECTIONS.

THE MUNICIPAL SUPPLY.

In cities having a public water supply, any infection of this supply would be likely to produce a large number of cases, and, what is of the greatest importance, these cases would largely occur in the area supplied by this supply. In a city like New York, infection of the public water supply would produce infections limited to one of the boroughs, (or in the case of infected Croton water, infections in the borough of Manhattan, and part of the Bronx) for the various boroughs have different supplies. It is important, especially in the outlying districts of a city always to remember that the main public water supply may not reach a given territory. For example, parts of Brooklyn still have comparatively small local supplies, although the main supply is from the Ridgewood pumping station.* If we

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* See the maps reproduced in the first part of this article.

1907

Manhattan and Bronx. Typhoid Cases reported each week, by Wards. Normal Incidence in Light Figures.

Week ending	Manhattan																						Bronx	
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th	19th	20th	21st	22nd	23rd	24th
January 5	.3	....	...	.1	....	.3	**1** .3	.4	.6	.2	.4	**8** 8.	.2	.1	.3	.6	**1** .6	1.1	**3** 4.	**1** 1.0	1.8	**3** 2.	**2** 3.	**2** 1.
" 12	.1	....	...	..	......	.5	**2** .7	.5	.9	**1** .3	.8	**11** 8.	.5	....	.3	**1** 1.	.7	1.3	**7** 2.	1.1	1.9	**3** 3.	4.	**1** 1.
" 19	**1** .1	....	....	.	....	.1	.5	**1** .6	.6	.3	1.	**8** 7.	.2	.2	.1	**1** .8	**1** .6	.6	4.	**1** 1.4	**1** 1.2	**3** 3.	**1** 3.	**1** 2.
" 26	.4	....	...		....	.1	.2	**1** .2	**1** .4	.3	1.4	**5** 7.	.5	.4	.4	.4	.8	**1** .9	**5** 2.	.8	**2** 1.0	**4** 3.	**3** 2.	1.
February 2	.0	....	**1**	.1	.2	.1	.5	**1** .3	.2	.4	**1** .6	**5** 6.	.2	**2** .1	**1** .3	.2	.5	.4	**6** 3.	.9	**2** 1.2	**3** 3.	**1** 3.	1.
" 9	.0	....	....	.1	....	.3	.6	.5	**2** .6	**1** .6	.6	**25** 5.	....	.2	.3	**3** .9	.5	**2** .6	**2** 3.	.7	**2** .6	**6** 2.	**2** 1.	1.
" 16	**1** .1	....	...	.2	**2** .3	.1	**2** .8	.1	.3	.4	.5	**8** 5.	.2	.4	**2** .4	**3** 1.	.4	.7	**6** 2.	.9	1.	**3** 2.	**4** 1.	1.
" 23	.0	....	...	.1	**2** .2	.1	.3	**1** .3	**1** .5	.4	**2** 1.0	**12** 5.	.3	.3	.2	**2** .7	.4	.9	**4** 3.	**4** 1.4	**2** 1.6	**1** 3.	**3** 3.	**1** 1.
March 2	.1	....	...		....	....	**1** .6	.1	.3	**1** .4	**2** .5	**6** 4.	**2** .3	.2	**1** .3	.6	.6	.2	**4** 3.	**2** 1.	**4** .7	**2** 2.	**1** 2.	**1** 1.
" 9	.3	....	...	.3	.1	.1	.7	....	**2** .3	**1** .3	**2** .2	**9** 5.	.2	.1	.1	.3	1.2	.2	**4** 3.	**1** .9	**3** 1.3	**7** 2.	2.	**4** 1.
" 16	.1	....	...	.	....	....	.3	.6	**1** .3	.3	.3	**20** 6.	.5	.3	.1	.4	.7	.8	**5** 2.	1.5	**1** .7	**11** 1.	**1** 2.	**1** 1.
" 23	.0	....	...	**1** .2	**1** .2	...	**3** .3		.4	**1** .3	**1** .7	**46** 4.	.4	**1** .4	**1** .4	**2** .3	1.0	**2** .7	**5** 3.	**2** 1.0	**3** 1.7	**10** 2.	**3** 1.	**3** 1.
" 30	.3	....	...	.1	.2	.	**1** .3	**3** .2	**3** 1.	.3	**1** .6	**50** 5.	**3** .7	**1** .2	**2** .2	**1** .5	.7	.6	**16** 2.	**3** .8	**4** .7	**18** 2.	1.	**1** 1.
April 6	**1** .3	....	...		.2	.2	**1** .6	.3	.6	.1	.2	**39** 4.	**1** .6	.1	.1	**3** .9	**2** .9	.3	**15** 1.	**1** .9	**9** .2	**8** 1.	**1** 1.	1.
" 13	.2	....	...	.2	.1	.1	**2** .3	.3	.1	.4	.5	**33** 3.	.4	.....	.1	**2** .5	**1** .4	**3** .7	**7** 2.	1.1	**1** 1.8	**5** 1.	**4** 1.	**5** 1.
" 20	**2** .3	....	...	**4** .2	.2	.1	**4** .5	.1	.3	.6	**2** .4	**40** 5.	.5	.2	.2	.4	**1** .6	**1** .7	**8** 2.	**1** 1.1	**6** .2	**6** 2.	**12** 2.	**3** 1.
" 27	.2	....	....	.1	...	...	**2** .4	.2	.5	**1** .4	**1** .7	**39** 3.	**1** .1	.3	**3** .4	.6	**1** .8	**1** .6	**9** 1.	**1** .8	**4** .9	**3** 2.	**7** 2.	**5** 1.
May 4	.2	....	...		.3	....	**1** .4	.2	.4	**1** .6	.4	**27** 5.	.4	.2	.....	**3** .8	**2** .7	**1** .4	**9** 1.	**1** 2.	**1** 1.0	**10** 3.	**6** 1.	**2** 2.
" 11	.4	....	...	.2	...	..	.6	.....	**2** 1.	.8	**1** .4	**10** 2.	.....	.....	.1	**2** .5	**1** .6	.5	**10** 2.	**3** 1.4	**1** .8	**5** 3.	**3** 2.	**2** 2.
" 18	**1**	....	..		.	..	**5** .6	...	**1** .3	.2	**3** .4	**13** 5.	**1**	**1**	**2**	**2** .9	.3	.....	**4** 2.	**1** 1.3	**2** 1.9	**5** 2.	**6** 2.	1.
" 25	.....	....	...	.	....	..	.6	...	.6	.3	.5	**14** 6.	.....	.....	.....	**3** .8	**1** 1.0	.....	**1** 3.	1.2	**1** 1.0	**2** 3.	**2** 2.	**2** 1.
June 1	.....	....	...	...	...	..	**1** .4	.....	**2** .6	**1** .6	**2** .4	**4** 5.	.....	.....	.....	**1** .4	**1** .6	.....	**3** 2.	.7	1.4	**1** 3.	**4** 2.	1.

Normal Incidence not shown for some of the smaller wards.

examine the statistics of typhoid fever in New York for some years past, we shall discover that there is regularly an enormous increase in the number of cases in the second half of the year, succeeded, in turn by a period of decreased frequency. In 1907, however, we note that there was an unusual outbreak of typhoid fever in March and April,* and further examination shows that this was limited to the borough of Manhattan. Investigations made at that time leave no doubt that this was due to infected Croton water. The preceding table shows the ward distribution of the cases occurring at that time, from which it is apparent that the increase affected all the wards in the borough.

In this connection I wish to call attention to the fact that the ordinary daily chemical and bacteriological examinations of the water supply do not necessarily disclose the presence of typhoid infection. I will preface this by saying that Croton water is derived from the Croton River and its tributaries, draining approximately 360 square miles of territory containing several large villages and a number of smaller ones. In certain parts of the Croton watershed there is considerable dairying, the land affording excellent pasturage. Under the circumstances it is not suprising that Croton water often shows colon bacilli in 1 c.c. and now and then also even in 1-10 c.c. It is impossible to say what proportion of these represent human fecal pollution. Knowing that the outbreak of typhoid fever in the borough of Manhattan in the spring of 1907 was due to infected Croton water, it is interesting to examine the following table (see next page) showing the bacterial counts and B. coli in January, February, and March of 1906 and 1907. (From the tabulation of cases, we may safely say that the water must have been infected during January and February.)

It will be observed that there is no real difference in the results obtained at the time of infection and results obtained before and after that time. The point I wish to bring out by this table, is, not that routine analyses are valueless, but that they cannot supplant sanitary surveys in the detection of probable sources of pollution. Moreover, in guarding over a public water supply drawn from a river, lake or other surface water, the public health authorities must constantly have accurate and prompt information concerning the occurrence of infectious water-borne diseases in the area from which the supply is derived, and should be prepared to deal with any cases even remotely endangering such supply.

In connection with the infection of a water supply drawn from streams or lakes, it is well to remember that whenever a lot of day laborers have been working in the territory from which the water is drawn, careful investigation should be made concerning the disposal of their excreta. It is the exception to find these laborers using the sanitaries provided for them, and

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* See chart showing the seasonal distribution of typhoid fever in New York in 1907 at the end of this article.

Bacteriological Examinations of Croton Water at the Gate House 135th Street

Right hand column: B. Coli
Left hand column: Bacteria

The B. coli content is expressed by means of three figures, thus 00+, or 0++, or +++, in which the left hand place indicates B. coli in 0.1 cc.; the middle place in 1.0 cc.; the right hand place in 10.0 cc.

1906				1907			
January	February	March		January	February	March	April
....	000	00+	1	....	00+	000	00+
....	340	19,290	1	....	465	380	00+
000	000	00+	2	00+	00+	....	000
1,590	825	20,000	2	1,510	400	—	435
00+	000	0++	3	000	000	00+	00+
6,480	375	11,700	3	1,955	260	400	410
00+	000	000	4	000	000	....	000
5,400	1,285	5,670	4	1,555	380	—	350
00+	000	000	5	00+	000	00+	000
3,800	925	—	5	770	270	375	275
000	00+	000	6	0++	00+	00+	00+
2,100	395	18,300	6	2,550	260	595	215
00+	000	0++	7	00+	000	000	000
4,800	740	31,000	7	—	335	415	200
000	00+	00+	8	....	000	00+	00+
1,580	815	28.000	8	....	3,350	450	610
00+	000	00+	9	+++	....	000	000
1,595	360	17,000	9	2,700	—	415	260
00+	000	00+	10	0++	00+	00+	000
1,500	320	21,000	10	6,520	2,100	470	195
000	000	00+	11	00+	00+	00+	00+
2,200	880	9,900	11	3,800	555	790	220
000	....	0++	12	00+	....	00+	000
2,490	—	1,980	12	2,040	—	645	215
000	000	000+	13	00+	00+	00+	000
3,570	815	2,245	13	1,365	520	800	290
000	00+	00+	14	0++	00+	00+	00+
1,830	795	1,680	14	1,810	505	375	210
000	....	000	15	000	000	000	000
1,230	455	765	15	1,090	375	215	220
000	....	000	16	00+	00+	00+	000
5,050	730	1,100	16	600	970	510	240
0++	....	000	17	00+	00+	00+	00+
3,380	1,330	615	17	635	660	635	225
00+	....	000	18	00+	000	00+	000
2,110	720	465	18	470	520	425	235
00+	....	000	19	....	00+	00+	000
....	385	875	19	—	650	885	525
000	....	000	20	000	00+	00+	00+
—	390	585	20	340	1,700	1,040	240
000	....	000	21	....	00+	00+	000
3,500	350	1,065	21	—	640	710	225
00+	—	000	22	00+	....	....	00+
170	—	915	22	630	—	—	150
00+	000	000	23	00+	....	00+	000
2,350	3,650	3,100	23	250	—	1,780	200
000	0++	000	24	000	00+	0++	000
1,900	2,300	510	24	240	650	5,760	160
000	0++	000	25	000	00+	00+	000
—	2,750	2,600	25	460	470	745	315
000	—	000	26	000	000+	00+	00+
1,500	—	355	26	188	450	830	330
000	00+	000	27	00+	....	00+	000
375	18,035	1,130	27	480	—	860	155
000	000	000	28	000	00	00+	00+
600	32,000	785	28	275	365	1,030	145
000	....	00+	29	0++	....	000	000
405	....	1,820	29	390	....	3,040	—
000	....	0++	30	000	....	00+	000
300	....	2,290	30	575	....	825	—
000	....	+++	31	00+	....	000	....
340	....	12,715	31	720	....	685	....

Courtesy of Dr. Daniel D. Jackson, Director Mt. Prospect Laboratory.

one will do well to hunt around in the bushes, behind fences and walls and the like, for collections of excreta.

Another point to which attention should be directed is the relation of the supply to the demands upon it. This will occasionally lead to the discovery of an additional supply whose use was unsuspected. In a water-borne outbreak of typhoid fever studied some years ago, I finally traced the infection to infected water surreptitiously turned into the regular supply. For the same reason it is advisable to make inquiries concerning any temporary cutting off of the regular supply, and concerning any repairs, break-downs, etc. If the surreptitious use of a particular surface water is suspected it may be possible to establish this fact by adding to the surface water in question some extraneous chemical, like lithium carbonate, and subsequently testing the supply suspected. This method was successfully employed by inspectors of the Health Department, some years ago, in demonstrating the use of a surface water by a company claiming to pump only from deep wells.

In studying the distribution of cases of typhoid fever believed to be water-borne, it may be well to determine, if possible, whether the supply is obtained from a main laid as a "dead end." Some writers, without, it is true, offering much proof, have held that the existence of such dead ends is responsible for a considerable number of cases of typhoid fever.

Another factor to be remembered in water-borne typhoid fever in the city, is the use of storage tanks on the roofs of houses. In repairing or cleaning such tanks it is usually necessary for someone to enter the tank, thus rendering an infection possible. Evidence pointing to this possibility must, however, be examined critically and should not be accepted unless it is very definite.

BOTTLED WATERS.

Before leaving the subject of water-borne infections, it may be well to remind the reader that some of the water at present so largely sold in bottles as "Pure Spring Water" is bottled and handled under conditions which would render typhoid infection comparatively easy. Moreover, the source from which these waters are drawn is not always so unobjectionable as the label on the bottle would indicate. I have not, however, been able thus far to trace an outbreak of typhoid fever to this source.

RAINFALL AND WATER-BORNE INFECTIONS.

In studying suspected water-borne typhoid fever in municipalities using impounded surface water for drinking purposes, attention should be paid to the weather conditions in the watershed during the month preceding the onset of the infections. The literature contains many instances where the infectious material was washed into the water supply at the time of spring freshets or during heavy rains.

In the light of the last two tabulations, the following record of rainfall in the Croton watershed (Bedford Hills Weather Station)* suggests a direct connection between the rainfall during the first half of January and the infection of the water supply.

Date.	Rainfall, in inches.
Dec. 31, 1906	1.50
Jan. 1, 1907	.08
3	.05
4	.35
8	.25
12	.42
14	.12
15	.03
17	4½ inches snow = .36 inches melted
19	.46

WELL WATER.

It is obvious that infected well water (excluding large wells used for municipal supplies) will always cause small, localized outbreaks of typhoid fever. In an institution, to be sure, the outbreak may assume considerable proportions. In general, however, infection from this source is not readily overlooked. It should be one of the first modes of infection to think of in cases occurring repeatedly about some small locality. It is the rule that the various cases do not all develop at or near the same time, but have onsets spread over a greater or less interval, but of course exceptions to this are frequent.

(*To be concluded.*)

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*Courtesy of Dr. L. Rosenberg, Montefiore Home Country Sanitarium.

American Journal of Public Health
Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. JUNE, 1912. Number 6

$2.00 a year. 20 cents a copy.
Livingston Farrand, M. D., Editor. Selskar M. Gunn, B. S., Managing Editor
Philip P. Jacobs, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

THE INTERNATIONAL CONGRESS ON HYGIENE

The official invitation, extended by the Government of the United States to other nations and to our own sovereign States, having been accepted by twenty-five countries and by forty-seven of the United States, it seems certain that the Fifteenth International Congress on Hygiene and Demography meeting in Washington next September, is a goal of great expectations. Less than this cannot be said, and more need not be said of the undertaking at this time. The mere announcement of great expectations will be found somewhat staggering, if one reflects that our country, in her first adventure of this sort, has proved able to bring the Old World over seas, and to assemble her own great family of States, at the same time, for a first American international congress on hygiene. No other country, perhaps, can evoke so large a response from within its own borders, and no other country has in the past received a larger response from without.

Among the people of the United States, none are entitled to look forward with livelier interest than the members of the American Public Health Association, or with a keener sense of responsibility for the preparations necessary to be made in consequence of the great expectations which we have aroused. Partly in the fact that the Congress is so largely officered by members of the Association, but mainly in forty years of continuous activity in the sanitary affairs of four countries, are reasons found for looking to the Association as a main source of that vitalizing function which will convert to the perpetual use of coming generations whatever saving knowledge the Congress may produce.

The Association will certainly furnish the torchbearers for the four countries. Canada, Cuba, and Mexico are sure to send old friends to Washington in the autumn. Two Canadian Ex-Presidents of the Association have already been named as delegates; Dr. Montizambert, to represent the Dominion Government; Dr. Lachapelle to represent Laval University.

The Association will not hold the only meeting to be held in Washington during the week of September 16th. The New England Water Works Association, the American Statistical Association, and the Conference of State and Provincial Boards of Health will hold meetings at that time; and during the Congress strong delegations will be present from the Association for the Study and Prevention of Infant Mortality, The Association for the Study and Prevention of Tuberculosis, The American School Hygiene Association, the Federation for Sex Hygiene, the Society of Mental Hygiene, and several other organizations.

There will be no lack of serviceable vehicles in which to freight back to all corners of this land whatever goods the Congress and the Exhibition may deliver. More than an announcement, this event is a challenge of great expectations.

INDIGENT CONSUMPTIVES IN THE SOUTHWEST

A Southwestern Conference on Tuberculosis made up of delegates from the States of Colorado, Texas, New Mexico, Arizona, and California was held in Waco, Texas, in April to consider the situation with regard to the disease in that section of the country.

The facts presented at the Conference reveal a condition of affairs that is intolerable. While exact information is lacking, it is certain that over five thousand persons with advanced tuberculosis migrate annually to the Southwest in hopes of a cure, and of all of those who come it is held that the majority are not only beyond hope of recovery but are even without means of support during the few months of life remaining to them. They naturally leave the trains at the few towns of size and immediately become charges on public or private charity in whole or in part. It is not strange that a vigorous and united protest is forthcoming from that entire region.

The responsibility rests largely, it would seem, on the shoulders of the medical profession of the East and North, which persists in recommending, or, at least permitting, indigent consumptives, even in the last stages of the disease, to leave their homes and die in loneliness and need under the glamour of a justly famed climate. The facts might well be included in the program of public health education which is now engaging the attention of the country.

THE ROLE OF THE SCHOOL IN THE SPREAD OF SCARLET FEVER

A LESSON FROM ONE SCHOOL IN PHILADELPHIA

Walter W. Roach, M. D.,
Supervisor Medical Inspection Fifth District

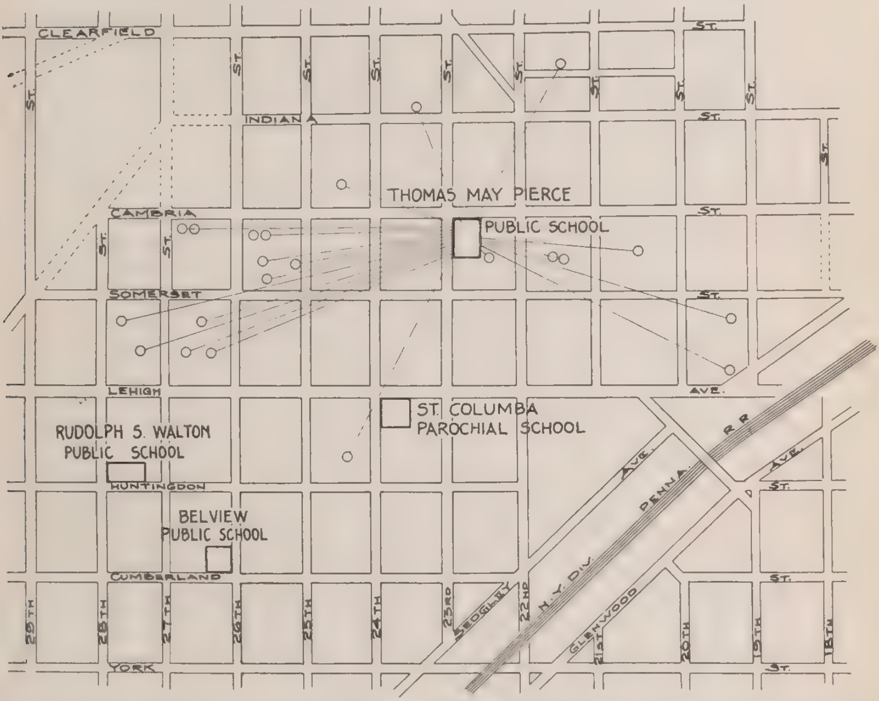
The theorem is quoted from an undoubted authority— the Commissioner of Health of Chicago, and is as follows:—

> "Unless properly safeguarded by class-room inspection schools are excellent spreading places for infection. The number of cases of infectious diseases always decrease when the schools close for the summer. A part of this dropping off is due to the warm weather. The number of children who get together on the streets constitute a smaller unit than the school unit. The contact within the street unit is not as close as it is in the school unit; therefore the school is a means of spreading contagion. At the same time the school-room is the only place available for the inspection of school children. When this inspection is close enough to watch contacts efficiently, then the schools become centers for clearing contagion and not for spreading it. Consequently the proper policy in an epidemic is not to close a school permanently, but to make the inspection closer and more thorough.

These points were clearly illustrated by conditions at the T. M. Pierce Public School, 23d and Cambria streets, Philadelphia, where the first child was reported with scarlet fever the last of January. Then followed six cases during February. There was no class-room inspection during this time, the school doctor under the rule calling each morning at the Principal's office to examine children referred to him by the teachers, who in the last analysis were the only medical (?) inspectors in the class-rooms, with the whole system depending upon their ability to primarily detect disease.

The "carriers" were undoubtedly in the school, hidden and unrecognized. Twelve more cases followed in March and well on into the month, when the medical man began class-room inspections he picked up seven cases in the school *desquamating*. The following chart shows the location of the homes of these Pierce School children, some coming from far east of the school-house, others from north of it and others from far west of it and nearer to two other schools where no cases occurred. If it had been a neighborhood epidemic other cases would unquestionably have occurred among pupils attending the Walton and Belview schools, but the cases point to one focus and here attention was directed. The Pierce School building was fumigated; inspectors were stationed at each entrance and the fourteen hundred pupils carefully examined. Suspicious ones were refused admission and investigated, while the others were allowed to enter and continue studies. The absentee records were scrutinized carefully and the homes of such children visited by nurses to learn whether or not sickness was the cause, and if so, what disease. The whole situation was cleared up in a short time.

DIAGRAM MAP SHOWING SPREAD OF SCARLET FEVER



Small circles locate homes of Scarlet Fever patients, lines of contact leading direct to Pierce School as focus; no other cases among families or pupils attending other Public or Parochial Schools in this territory.

MALARIA CONTROL IN CALIFORNIA

Harold Farnsworth Gray,
Berkeley, Cal.

Malaria in California is confined to certain fairly well-defined regions, chiefly the Sacramento-San Joaquin valley and the adjacent foothills. There is but little doubt that the agricultural development of this vast area has been, and still is, greatly retarded by the prevalence of the disease. Certain districts are notoriously malarial, and property is in some instances depreciated at least 50 per cent. Compared with the malaria death rate of 4.8 per 100,000 population given by the 1910 census as the average for the entire registration area in the United States, certain districts show extremely high malaria death rates, as for example the Shasta-Tehama-Butte county area, for which the California State Board of Health statistics give a death rate of 46.8 per 100,000, and the Placer-Sacramento-San Joaquin county area, with a rate of 20.4 per 100,000.

On the basis of the death rate from malaria, Dr. William F. Snow, Secretary of the California State Board of Health, has conservatively estimated that the state sustains an annual economic loss of $2,820,000, of which 80 per cent., or $2,256,000, is preventable. Yet this fact has been largely viewed with apathy, indifference, or derision. If this loss were sustained by the live stock of the state, it is safe to say that ample funds would be supplied by both the state and the federal government to control the disease, and the public would clamor for its extermination.

In a few isolated instances, however, some anti-malaria work has been done with a fair amount of success. Its inception occurred as a result of the lectures of William B. Herms, Assistant Professor of Entomology in the University of California, during the runs of the Agricultural and Horticultural Demonstration Train. This train has seven cars of exhibits, one-half of one car being given to rural health problems. During the first two seasons of the operation of this train no interest in malaria control was manifested, but in 1910 considerable work was done. As each campaign was a separate effort, in widely separated districts, they will be considered briefly and individually.

The first work was commenced in March, 1910, at Penryn, Placer County, the center of a large deciduous fruit region, and notoriously malarial. It had been preceded by lectures on malaria, given at the request of the citizens by Professor Herms, in the adjacent towns of Auburn, Newcastle, Penryn, Loomis and Roseville, Penryn being the only town to effect an organization and raise funds. Professor Herms superintended the field operations and placed certain of his university students in charge of the field work. The field men were paid at the rate of $75 per month, but in only three months did they devote full time to the work, a total of 180 working days being put in, though the operations extended over a period of six months.

With the slender funds available but little drainage work was done, and the use of oil was chiefly relied on to destroy the mosquitoes. No quinine prophylaxis was attempted. The campaign continued from March to November, considerable educational work being done in the last two months. The results obtained can be seen from the school attendance reports, which show a reduction of 46 per cent. in the number of absences from malaria as compared with the previous year. The area covered was about six square miles, and the cost of the campaign was $715.75, divided about as follows:

Equipment	$30.83
Materials (Oil, freight, etc.)*	39.47
Field Agents (Salary and expenses)	498.40
Expert's Expenses (Herms)	129.15
Incidentals	17.90
Total†	$715.75

In 1911 it was intended to carry on the anti-malaria campaign in Penryn, but operations were not begun pending the action of the state legislature in regard to a bill providing for the formation of special anti-mosquito districts, by the operation of which money could be raised by taxation for the conduct of anti-malarial measures. Unfortunately, this bill was badly constructed and, though passed by the Legislature, was properly vetoed by the Governor. Upon the failure of this bill, it was found impossible to raise the necessary money for the campaign (one man gave half of the money in 1910, but demanded that this year every one pay his proper share), and so no work was done. Efforts to raise money for this year have failed so far, though undoubtedly a majority of the residents are in favor of carrying on the campaign.

The second campaign was commenced in Orovillle, Butte County, the field work beginning the last of March, 1910. A local organization, the "Oroville Anti-Mosquito League," raised the money needed by various methods. The campaign was supervised by Professor Herms, and the records of the dredger companies showed from 50 to 75 per cent. less absences from work on account of malaria, as compared with former years. Unfortunately, no records of the cost of the work were kept, but I believe that the sum expended was about $800. One man was employed to perform the field work at a salary of $75 per month.

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* Approximately 360 gallons of 32 degrees Baumé, treated stove oil used.

† Does not include cost of horse and rig, which was donated.

Oroville continued the campaign in 1911, but devoted part of its energies to the reduction of the numbers of houseflies, with a resulting improvment in the sanitary condition of the town, and a further apparent reduction in the prevalence of malaria. No actual statistics were available, as in the previous year. Cost records were kept up to the first of August, when the trained man in charge of the field operations was replaced by a laborer. This was necessitated by the lack of funds. The cost of continuous work from April first to August first was as follows:

Field Agent	$500 00
Materials (Oil, Freight, etc.)*	58.95
Rig Hire	48.00
Incidentals	26.60
Total	$633.55

One of the results of the 1911 campaign was the installation of an efficient Board of Health, and the passage of new public health ordinances. The campaign is now in progress for the season of 1912, under the direction of this new Board of Health, a local man with no training in entomology doing the field work. The monthly salary of this man ($75) is paid by the trustees from the general fund, and the health officer has given his salary ($30) for the purchase of oil and other expenses. A committee of five women is assisting in locating mosquito breeding places.

The city of Bakersfield commenced an anti-mosquito and anti-fly campaign in August, 1910, $1,000 being raised for the purpose by the anti-mosquito committee of the Woman's Club of that city. This campaign was continued until June, 1911, when it stopped for lack of further funds. The general sanitary conditions were materially improved, but we have no statistics on the subject and no cost data. Mosquito control is a difficult matter in Bakersfield, as it is surrounded by marshes, and the prevailing winds carry thousands of Culicines into the city every day of the breeding season. The Anophelines were very greatly reduced.

In September, 1911, a request was received by Professor Herms from the Los Molinos Land Company, owning 10,000 acres of irrigated land in Tehama County, to assist in controlling malaria on this project. The writer made a preliminary report on the subject in that month, and anti-malaria work is now proceeding under his direction. During the winter the irrigation system has been revised, enlarged and improved, and drainage provided. At present two laborers are constantly at work on drainage and oiling. Money for the prosecution of the campaign is being liberally provided by the company, and with sufficient funds assured the success of the work is certain. The campaign is being carried on systematically.

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* Approximately 360 gallons of treated stove oil (32 degrees Baumé), and 160 gallons water white kerosene.

All cases of malaria are reported and investigated, card indexes are used, and all breeding places are mapped and recorded as to treatment. Accurate cost records will be kept and educational publicity will be undertaken by the local press.

At present there are several communities that are attempting to organize campaigns and raise money for their prosecution, but it is too soon to make any statement in regard to them. Three main propositions are now under consideration, viz.: amending the state "Sanitary Districts Act" at the next session of the Legislature, so that its provisions may be used for the formation of districts for the control of malaria, and the raising of money for the purpose by local taxation; the obtaining of a state appropriation for a comprehensive campaign over the whole malarial area; the obtaining of aid from the federal government for a detailed study of the problem the results of this study to be used as a basis for extended operations when funds are available.

In the meantime, constant publicity is being kept up in the newspapers of the state, and the people are hammered hard on the subject every winter by the lecturers of the rural health exhibit on the "Demonstration Train." Progress is disappointingly slow, but none the less sure.

In all the campaigns carried on so far, with the exception of the Los Molinos project, which has not progressed far enough as yet to show results, the money available has been pitifully inadequate for the purpose. As the campaigns have been inaugurated by committees of citizens, no legal authority or dignity has been given to the movement, and even the laws have been found to be ineffective. As a result of having so little money to work with, but very little permanent improvement has been made, compared with what is possible. Mosquito control has been the system of prophylaxis, this control being based on the oiling of breeding places. No quinine prophylaxis has been attempted, both on account of lack of funds, and because of the American citizen's belief in his inherent right to poison himself and his family with patent remedies if he wants to. And yet, in spite of these difficulties, marked results have been obtained, results which show conclusively that under the management of a trained and experienced person, supplied with sufficient money, and backed by proper laws and legal authority, malaria can be at the very least largely reduced in its prevalence, and in time probably completely exterminated in certain regions of California.

MINUTES OF THE THIRTY-NINTH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

HAVANA, CUBA, December 5–9, 1911

The thirty-ninth annual meeting of the Association was called to order in the Ateneo, Havana, Cuba, December 5, 1911. The President, Dr. Robert M. Simpson, in the Chair, and about 100 members present.

The minutes of the preceding meeting having been published in the Journal of the Association, reading was, by unanimous consent, dispensed with.

The Executive Committee reported that the President of the Association, Doctor Simpson, had donated to the Association during the year $250.00, and for the Committee recommended that a vote of thanks be passed in acknowledgment thereof.

Doctor Bryce moved that the recommendation of the Executive Committee be approved and that the Association thank Doctor Simpson for his generous donation. Doctor Bryce's motion, having been duly seconded, was put to vote by the Secretary and was unanimously carried.

The report of the Committee on Membership, duly approved by the Executive Committee, was then presented, recommending for election the following named applicants:

December 5th, 1911.

ACTIVE.

NAME	ADDRESS
Alexander, Andrew B., M.D.	Winnipeg, Manitoba, Canada.
Amoss, Harold L., M. D.	Harvard Medical School, Boston, Mass.
Barham, William B., M. D.	Newsoms, Southampton Co., Va.
Barringer, Paul B., M. D.	Blacksburg, Va.
Bauman, James E.	1737 Oak street, Columbus, Ohio.
Beckwith, Theodore D.	Agri. College, Corvallis, Oregon.
Beitler, Frederic V., M. D.	Ridge avenue, Halethorp, Md.
Benedict, Samuel C., M. D.	127 East Broad street, Athens, Ga.
Botsford, Charles P., M. D.	1337 Main street, Hartford, Conn.
Brown, Lucius P.	898 Church street, Nashville, Tenn.
Bow, D. C.	3119 Minnehaha avenue, Minneapolis, Minn.
Bunker, John W. M.	216 Pleasant street, Newton Center, Mass.
Chester, John N.	Union Bank Bldg., Pittsburg, Pa.
Chew, William H.	Front & Market streets, Camden, N. J.
Darey, J. Herbert, M. D.	Sioux City, Iowa.
De Aragon, Ernesto, M. D.	59 Salud street, Havana, Cuba.

De la Guardia, Vincent, M. D.	19 y D Vedada street, Havana, Cuba.
Diggett, Emesi W., M. D.	Tallahassee, Florida.
Dyer, Elbridge G.	119 College street, New Haven, Conn.
Eaton, John M., M. D.	Virgen, Manitoba, Canada.
Elwood, Everett S.	105 East 22nd street, New York, N. Y.
Escato, Federico, M. D.	113 Independence street, Mantanzas, Cuba.
Fernandez, Juan Santos, M. D.	105 Prado, Havana, Cuba.
Ferrell, John A., M. D.	Raleigh, N. C.
Furbush, C. Lincoln, M. D.	1501 Spruce street, Philadelphia, Pa.
Folks, Homer,	428 Hawthorne avenue, Yonkers, N. Y.
Folsom, William C.	2523 Essex place, Cincinnati, Ohio.
Force, John Nivison, M. D.	2952 College avenue, Berkeley, Calif.
Fort, Arthur G., M. D.	97 Lawton street, Atlanta, Ga.
Gray, Harold F.	2540 Benvenue avenue, Berkeley, Calif.
Halsey, William H., M. D.	The Benedick, Washington, D. C.
Hastings, Charles J., M. D.	2521 Russell Hill Drive, Toronto, Canada.
Hayne, James Adams, M. D.	Le Conte College, Columbia, S. C.
Hernandez, Eusebio, M. D.	Carlos III 22, Havana, Cuba.
Houghton, Elijah M., M. D.	130 Longfellow avenue, Detroit, Mich.
Hudson, Carlos C., M. D.	6 East Franklin street, Richmond, Va.
Hunt, Charles J., M. D.	State Dept. of Health, Harrisburg, Pa.
Latta, Samuel W., M. D.	233 South 4th street, annex, Philadelphia, Pa.
Lebredo, Mario, M. D.	San Jose 99, (altos) Havana, Cuba.
McComb, David E., C. E.	Hotel Florida, Havana, Cuba.
McKay, William G.	325 East Forsythe street, Jacksonville, Fla.
McMillan, Marion B., M. D.	411 West 57th street, New York, N. Y.
MacKnight, Adam S., M. D.	355 North Main street, Fall River, Mass.
Martinez, Emilio, M. D.	Neptuno, 56, Havana, Cuba.
Matson, Eugene G., M. D.	431 Sixth avenue, Pittsburgh, Pa.
Melia, Thomas W.	Flatbush avenue and Eastern Parkway, Brooklyn, N.Y.
Mullin, Robert H.	827 University avenue, southeast, Minneapolis, Minn.
Messer, Richard, C. E.	1110 Capital street, Richmond, Va.
Nelson, Robert, M. D.	1203 Empire Building, Birmingham, Ala.
Nichols, Nelson E., M. D.	657 Congress street, Portland, Me.
O'Brien, John, Jr.	104 East Front street, Plainfield, N. J.
Pazos, Jose Francisco, M. D.	71 Apodaca street, Havana, Cuba.
Porter, Sidney D., M. D.	La. State Board of Health, New Orleans, La.
Pottenger, Francis M., M. D.	Monrovia, California.
Ramos, Domingo, M. D.	234 Neptuno, Havana, Cuba.
Read, Clark Potter	111 Broadway, New York, N. Y.
Rucker, James B., Jr., M. D.	Lansdowne, Pa.
Sayle, Robert G., M. D.	129 16th street, Milwaukee, Wis.
Schench, Powhatan S., M. D.	17 Raleigh street, Norfolk, Va.
Thomson, John T.	5427 Kingsessing avenue, Philadelphia, Pa.
Villuenda, Florencio, M. D.	55, Lagueruda, Havana, Cuba.
Werner, Ray Cowles	528 West Peachtree street, Atlanta, Ga.
Weston, Edmund Brownell, C. E.	P. O. Box, 1316, Providence, R. I.
Wheeler, William, C. E.	14 Beacon street, Boston, Mass.
Wheatley, Louis F., M. D.	53 1-2 West Main street, Meriden, Conn.
Wolff, Arthur J., M. D.	320 Collins street, Hartford, Conn.
Woody, Samuel S., M. D.	2nd and Luzerne streets, Philadelphia, Pa.

ASSOCIATE.

Adams, Frank	Jacksonville, Fla.
Baker, John D.	Jacksonville, Fla.
Brooks, Vernon, M. D.	405 Court street, Portsmouth, Va.
Decker, Asbury C.	2114 First avenue, Birmingham, Ala.
DePree, James	Holland, Mich.
Fox, Hugh F.	508 Central avenue, Plainfield, N. J.
Haas, William P.	152 State street, Hartford, Conn.
Hasker, Everett L.	3018 east Broad street, Richmond, Va.
Hilliard, Curtis M.	87 Middle street, Braintree, Mass.
Palmer, George T.	211 Newbury street, Boston, Mass.
Pomeroy, Carl T.	104 East Front street, Plainfield, N. J.
Potter, Burton D.	2038 State street, New Haven, Conn.
Round, Lester A.	41 Park street, Providence, R. I.
Merrill, Alexander R.	Jacksonville, Fla.
Smith, George H.	107 George street, Providence, R. I.
Speaks, Charles E.	Marietta, Pa.
Sundberg, John Christian, M. D.	6 Aldwell Block, Port Angeles, Wash.
Thompson, Charles T.	11 Livingston avenue, New Brunswick, N. J.
Underhill, Elizabeth C., M. D.	Mount Holyoke College, South Hadley, Mass.

Doctor Guion moved that the Secretary cast the ballot of the Association for the applicants named above. Carried unanimously. The Secretary having cast the ballot in accordance with the instructions of the Association, these applicants were declared duly elected.

The Secretary then read his report, as follows:

REPORT OF THE SECRETARY.

It has not been customary for the Secretary to submit at the annual meetings of the Association anything in the way of a formal report of the operations of his office during the preceding year. The Secretary, however, is brought so closely into touch with all of the work of the organization that it might not be inadvisable to require of him some such account of his stewardship.

The Association does not occupy the place it should in public affairs and public esteem in the several nations that it represents. Had it kept fully abreast of the tides of sanitary affairs, there would today have been no National Association for the Study and Prevention of Tuberculosis, no Association for the Study and Prevention of Infant Mortality, no society for Social and Moral Prophylaxis, no Association for the Prevention of Blindness, each working independently of the others and of this Association; but each of the organizations named and others, if they existed at all, would exist as bodies whose work was definitely correlated to the general sanitary work of the American Public Health Association and definitely correlated through the Association with the work of one another, possibly as sections of the Association. And how much more economical and efficient such an arrangement would be is too manifest to require comment.

Opinion will doubtless differ as to the real causes for the failure of the American Public Health Association to meet the needs of the community as they arose with respect to advances in sanitation. To my mind, however, the default has been due in part at least to the fact that the members of the Association have been too busy talking health and sanitation to give a proper amount of attention to the matter of securing for the Association efficient, energetic management according to modern business methods. And one of the most potent defects in the existing scheme of organization lies in the fact that as a more or less efficient machine, the Association exists for but a few days each year. The rest of the twelve months it is a mere paper organization, so to speak.

Under the constitution and by-laws of the Association as they now exist, and as they have always existed so far as I know, it is and has been impossible to elect a member except during the annual meeting. For a period of from four to six consecutive days each year applications for membership can be acted upon; during the remainder of the year they can not. The result is that before each annual meeting there is a more or less active campaign for new members, and that as soon as the convention is over nothing is or can be done for another twelve months. Money spent before a meeting for the purpose of interesting persons throughout the several countries represented in the Association in the activity of the American Public Health Association is lost, because if such possible members fail to file their applications at that particular meeting their interest usually wanes before the next.

Objection has been made that the election of a new member is a matter of so much importance that nothing less than the entire organization could safely be entrusted to consider and act upon it. Those who are familiar with the actual working of present practice know that an application for membership is submitted to the Committee on Membership in a hurried meeting along with many other applications, when there is absolutely no fair opportunity to inquire into the qualifications of the applicant. If it is pushed along through the Committee on Membership, it is next acted on in a perfunctory way by the Executive Committee, and it then comes before the Association and is acted upon even more perfunctorily. No applicant recommended by the Committee on Membership ever fails of election. If, on the other hand, election could be made by the Committee of Seven during the intervals between meetings, then there would be ample time to consider carefully the qualifications of any applicant, and the Committee could act intelligently with respect to his application.

But if it has been made difficult to get into the Association, there has been no obstacle placed in the way of anyone getting out. Upon a receipt of a resignation from a member, it has been customary unceremoniously to drop his name from the rolls without action by the Association or even by a committee. The same course has been followed with respect to delinquent members. The importance of keeping a member in after he has shown sufficient interest to enter had apparently never been realized. Certainly, it seems to me, under the present constitution and by-laws no officer and no committee of the Association has any authority to drop the name of any member from the rolls, but the Association itself should act. In the meantime, too, pending action by the Association, an earnest effort should be made to induce the member whose resignation has been handed in or who has failed to pay his dues to take whatever action may be necessary to renew his membership.

It is important that the Association determine just what it desires to be. The present constitution, adopted at Winnipeg, August 26, 1908, seems to have been adopted with the idea of strengthening the technical character of the Association. The constitution in force prior to that time provided that the active members should constitute the permanent body of the Association and should be selected with special reference to their acknowledged interest in or devotion to sanitary studies and allied science and the practical application of the same. The terms of the constitution were sufficiently broad to allow the Committee on Membership, the Executive Committee, and the Association great latitude in determining who might and who might not be elected to active membership. The Winnipeg constitution, however, provides that active membership may be accorded only to those who have been for a period of three years in the active professional practice of technical branches of public hygiene, or have been for a period of three years on the executive or technical staffs of governmental departments dealing with phases of public hygiene in the countries represented in the Association; to associate members, who have qualified under certain specified provisions; to foreign members recommended by the Advisory Council; and to delegate members under certain specified restrictions. Already difficulty has been experienced under this constitution, and thoroughly desirable sanitarians have hesitated about applying for membership because under the constitution they could be ranked merely as associate members. So serious has been this difficulty that an amendment was proposed at the Milwaukee meeting and is now pending, giving to the Executive Committee the right to recommend for active membership persons presenting satisfactory qualifications in lieu of the three years' service specified above.

It may be seriously questioned, however, whether the Association will not grow more in numbers, and whether it can not grow at least as well in power and influence, if the distinction between active and associate members be wiped out and the American Public Health Association frankly acknowledge itself to be the great popular health organization, uniting the four great countires represented in it. Under such an organization, technical work could be done in sections, just as such work is now done in connection with the National Association for the Study and Prevention of Tuberculosis. If, however, on the other hand, the Association desires to stand before the public as a technical organization, analogous to the American Society of Civil Engineers and like organizations, then it must frankly recognize the facts that it can never have any great membership and it must either limit its field of endeavors so as to cover it efficiently with the income received from members or else must frankly look for outside conritbutions for support. And it may be suggested that outside contributions for health work are hardly as likely to be made to a technical organization as to one operating on a more popular scale.

The working organization of the Association is too loosely made up and too cheaply run to be effective. And yet the organization is most extravagant. The Association undertakes to maintain three offices in three different parts of the country. The Secretary's office is in one part of the country, the Treasurer's in another, and the office of the Managing Editor in a third. If these or any one of them were mere honorary offices there might be no serious objection to the plan. But they are not; each is an actual working office. The result is duplication of effort and waste of money and energy. The Secretary has a mailing list, the Treasurer a mailing list, and the Managing Editor a mailing list. Envelopes, wrappers, addressing and postage, are, therefore, triplicated.

No one officer of the Association receives from the Association compensation sufficient to command any considerable part of his time—that is, if his time is worth anything. The Secretary receives an honorarium of four hundred dollars per annum, but pays his own expenses to and from meetings of the Association, and pays for the services of an assistant at the annual meeting if he has one. The Treasurer receives an honorarium of two hundred dollars per annum, and pays his own expenses to and from the meeting. The Managing Editor receives a salary of two hundred dollars per annum, and has an interest in the profits of the Journal, which profits, however, are not yet in sight.

The status of the Manager of the Journal is somewhat different from that of the Secretary and Treasurer, because in theory at least he has opportunity to increase his income up to any reasonable point by making the Journal a financial success, although it must be admitted that the opportunity of doing so appears at the present time to be remote. With respect to the Secretary and Treasurer, however, anyone of four conditions may exist. A Secretary or Treasurer may be found who is sufficiently wealthy to justify him in paying out of his own funds for the services of a clerk or clerks sufficiently competent to relieve him not only of the routine clerical work of the office but also of the supervisory work. Or, a member may be found willing to accept the secretaryship or the treasurership whose time is of so little value that he can afford personally to look after the work of the office. Or, in the third place, a member may be found, conceivably, who could in some way use the secretaryship or the treasurership to further private ends, so that the honorarium from the Association would be of minor importance.

Or, in the fourth place, a competent secretary or a competent treasurer may be found who, at a considerable personal sacrifice, will conduct the work of the office.

The fourth contingency is the only one that is like to happen. It is certain, however, that no matter how willing a member of the organization may be to work for the Association at a personal sacrifice for a time, he can not continue it indefinitely, and frequent changes in either of the offices named are detrimental to good management. Neither would it appear that there is any justification for asking any one member to work for the Association at any great personal loss of time and energy. No such demand would be made upon any one with respect to money, and there is no more reason why it should be made with respect to time and energy. When one gives to the Association his time and his service that if directed in some other channel might bring in a substantial money return, he is contributing cash to the Association out of his own pocket just as much as if he earned the cash and turned it over to the Association. If the members of the Association desire fairly to distribute the burden of its work, they must provide for the adequate remuneration of the secretary and treasurer, to keep them more or less permanently in office. In order to do this, too, the Association must select and maintain headquarters in some given locality, so as to identify itself with that particular place.

It may be said that the Association is not financially able to carry into effect the arrangement suggested. In my judgment it is not likely that the Association will be able to do so so long as it continues to look around for endowment funds and contributions of considerable size and ignores smaller amounts. There are certainly but few members in the Association who could afford to contribute in cash to the Association in any one year, $1,000, $500, $100, or possbily even $50.00. It is not at all unlikely, however, that many could be found who would give one or two dollars a month, or a quarter, or possibly every six months. And the sum total of the amounts thus contributed would in the end be ample for the support of the organization. At least one organization, one not directed to the promotion of public health or to the promotion of any good end, obtains its funds to a certain extent in the manner suggested, and it seems always to have ample funds for its purposes. That, however, is no reason why the Association should not adopt the same plan for the raising of funds for good purposes.

A change should be made with respect to the control of the expenditures of the Association. As the Auditor who examined the accounts of the Managing Editor reported, it is impossible to make any satisfactory financial statement of the condition of the Association so long as some accounts are kept in one part of the country and some in another. Difficulty arises, moreover, in complying with the requirements of the constitution which provides that all appropriations for usual current expenses shall be made by the Committee of Seven. In practice this provision of the constitution is regularly ignored, the Chairman of the Committee of Seven and the Secretary acting for the committee without consulting the entire membership. To consult the entire membership would involve a very considerable delay in the payment of bills, to the embarrassment of those who contract them and to the annoyance of many petty creditors.

The Committee of Seven, or some similar body, should be given wide discretion to act with respect to public health movements. It is not at all inconceivable that in the period that elapses between annual conventions questions of importance may arise concerning which action might logically be taken by the American Public Health Association, in the interest not only of the public but of the Association. If, for instance, when any important public health movement is underway, such as that that led to the organization of the American Association for the Study and Prevention of Infant Mortality, and other similar movements, the Committee of Seven were authorized definitely and positively to speak for the Association and to undertake to handle and direct such a movement, the coördination of public health agencies in the future would be assured. As it is now, the most that can be done is for the officers of the Association to sit by and watch the movement culminate in the organization of some new congress or association, tending thus to withdraw the interest and support of the American

Public Health Association and necessitating the organization of new machinery on the part of the promoters of the new movement when the machinery already established by the American Public Health Association should be ample. As has been pointed out before, the Association should exist in fact as well as in part at all times.

It would seem that some definite provision should be made with respect to members of the Association who speak Spanish only. This year, application blanks have been printed in Spanish, as have also circulars of information relative to the Association, and memoranda relative to the preparation of papers. The Journal of the Association is published, however, only in English, and the proceedings are not available to a very considerable number of members residing in Mexico and Cuba. The Secretary has no suggestions to offer with respect to this matter, but calls it to the attention of the Association for its consideration and with the hope that some means may be devised whereby the papers and reports of the Association may be available to all members.

The Association should endeavor to be of larger service to its members, and it cannot be of such service without funds. During the past year the Secretary has been requested to furnish information to one city relative to the control of water supplies. Another has asked for information relative to school hygiene, a third has asked for health literature generally, one of the great organizations of the country has asked for a bibliography of works relating to sanitation, and other similar requests have been received. These requests show the position that the writers have thought the American Public Health Association occupied, and they show the position which the Association should occupy. Funds should be available for the compilation of data of this kind for interested inquirers, and the very fact of being able to compile such data and to furnish it promptly would be an inspiration to those outside of the organization to become members.

I have presented these somewhat discursive remarks, put together as best I could in a very limited time, so that those who are not so closely in touch with the affairs of the Association as is the Secretary, may know something of the true condition of the organization, and with the expectation that they will take action to correct conditions retarding its growth or else themselves assume responsibility for them and for the failure of the Association to fill its proper place in the life of the people of the several countries which it undertakes to serve.

WM. C. WOODWARD,
Secretary.

December 5th, 1911.

Doctor Holton moved that the report of the Secretary be referred to the Executive Committee. Carried.

On behalf of the Executive Committee, the Secretary then submitted the report of the Treasurer, duly audited and approved by the Committee of Seven, as follows:

FRANK W. WRIGHT, *Treasurer.*

In Account with the American Public Health Association.

Dr.						*Cr.*
1910			1910		Order No.	
Sept. 15.	Bal. in general account	$991.54	Sept. 15.	W. R. Stokes......	357	$0.80
	Bal. in savings bank..	2622.40	15.	Am. Jour. Pub. Hy.	358	656.00
	Interest to July 1, 1911	105.92	15.	Judd & Detweiler..	359	4.50
	Sale of Transactions..	602.59	15.	Crane Printing Co.	360	43.60
	Back dues..........	190.00	15.	Letter Shop......	361	5.90
	Dues for 1910.......	2960.00	15.	W. C. Woodward..	362	107.39
	Advance dues.......	225.00	15.	W. C. Woodward..	363	400.00

Dr.						*Cr.*
1910			1910		Order No.	
Sept. 15.	Dr. R. M. Simpson	$250.00	Sept. 15.	Spahr & Glenn	364	$42.50
	Subscriptions	697.40	28.	James O. Jordan	365	4.55
		———	Nov. 15.	W. C. Woodward	366	203.94
	Carried forward	$8644.85	15.	Welling, Paret & Co	367	16.90
			15.	F. J. Heer Prt'g Co.	368	3.60
			15.	B. R. Rickards	369	10.00
			15.	W. C. Woodward	370	25.50
			15.	Crane Printing Co.	371	5.50
			15.	Judd & Detweiler	372	5.00
			15.	Letter Shop	373	5.65
			15.	W. C. Woodward	374	36.13
			1911			
			Jan. 1.	Wm. Whitford	375	163.56
			3.	Crane Printing Co.	376	5.00
			3.	Letter Shop	377	2.85
			3.	U. S. Express Co.	378	2.50
			3.	Wells, Fargo & Co.	379	0.50
			3.	Adams Express Co.	380	0.76
			3.	American Exp. Co.	381	0.20
			3.	C. G. Stott & Co.	382	1.75
			Feb. 3.	Lanman Engraving Co.	383	2.00
			21.	Judd & Detweiler	384	3.75
			24.	Wells, Fargo & Co.	385	0.75
			24.	J. A. Hauff	386	15.00
			24.	B. R. Rickards	387	145.32
			24.	E. H. Sells & Co.	388	4.70
			Mar. 10.	W. C. Woodward	389	79.24
			29.	W. C. Woodward	390	33.20
			16.	F. W. Wright	391	37.10
			16.	A. J. Slack	392	25.50
			29.	Spahr & Glenn	393	14.50
			29.	Spahr & Glenn	394	246.75
			Mar. 5.	B. of H. Manchester	395	2.00
			29.	W. C. Woodward	396	27.01
			May 1.	B. R. Rickards	398	202.00
			22.	T. Powell	399	5.00
			June 12.	B. R. Rickards	400	106.49
			12.	H. W. Hill	401	38.09
			20.	C. G. Stott & Co.	402	2.05
			20.	Spahr & Glenn	403	588.30
			20.	W. C. Woodward	404	78.54
			July 7.	W. C. Woodward	405	57.55
			7.	R. M. Simpson	406	75.00
			7.	E. C. Levy	407	59.40
			Aug. 11.	B. R. Rickards	408	263.08
			11.	H. W. Hill	409	15.55
			11.	H. W. Hill	410	3.57
			Sept. 1.	Letter Shop	411	2.80

Dr. *Cr.*

1910		Order No.	
Sept. 15.	Crane Printing Co.	412	$143.44
27.	W. C. Woodward	413	48.50
Oct. 19.	C. G. Stott & Co.	414	2.05
19.	B. R. Rickards	415	230.29
19.	W. C. Woodward	416	39.38
19.	Crane Printing Co.	417	8.75
24.	B. R. Rickards	418	107.63
23.	F. W. Wright	419	213.35
Nov. 10.	The Letter Shop	420	5.00
10.	Crane Printing Co.	421	44.50
11.	Spahr & Glenn	422	21.00
14.	W. C. Woodward	423	71.28
	Total		$4823.99
	Cash in savings bank		2728.32
	Cash on hand		1092.54
			$8644.85

Audited and found correct:
December 4, 1911.
W. R. Batt,
Gardner T. Swarts,
Audit Committee.

Doctor Guion moved that the Treasurer's report be accepted and placed on file. Carried.

Resignations were received from the following members of the Association:

Eugene L. Hollister, Joseph Raymond, Herbert W. Williams, Francis H. Bennett, Kenneth Bradford, R. G. Broderick, Wm. Francis Drewry, M. S. Evans, Alfred P. Hanchett, Milton H. Hershey, Edgar H. Lancaster, Bernard A. Parsons, R. A. Pearson, Herbert E. Smith, Byron Stanton, Chas. F. Whiting, Thomas Wilson, John W. Ross, W. J. Lumsden.

Doctor Bell, of Toronto, moved that these resignations be accepted. Carried.

Papers were then read as follows:

1. Annual Report on Yellow Fever in the Republic of Mexico, by Dr. Eduardo Liceaga, President, Superior Board of Health, Mexico.

2. False Alarm of Yellow Fever in Banes, Cuba, in connection with the Cuban Sanitary Organization, by Dr. Juan Guiteras, Director of Public Health, Cuba.

The papers named above were discussed by Drs. Gardia, Lebredo, Anderson, Guiteras, and Mendizabel.

3. Tropical Diseases, in Cuba by Dr. Enrique B. Barnet, Chief Editor, Department of Sanitation and Charities, Cuba.

Discussed by Dr. Escoto.

4. Typhoid Fever in Havana, by Dr. Jose A. L. del Valle, Chief Health Officer, Havana, Cuba.

5. Studies in Rural Typhoid Fever in Virginia, by Dr. Allen W. Freeman, Assistant Commissioner of Health, State of Virginia, and Dr. Leslie L. Lumsden, United States Public Health and Marine Hospital Service.

6. Report of Typhoid Fever in Richmond, Virginia, during 1909–10–11, by Dr. Ernest C. Levy, Chief Health Officer, Richmond, Virginia.

7. The Use of Antityphoid Vaccine in Public Institutions in Maryland, by Dr. Frank W. Hachtel and Dr. Harry W. Stoner, Baltimore, Maryland.

8. Report of Committee on Reporting Typhoid Fever, by Dr. Hibbert W. Hill, Chairman, Minneapolis, Minnesota.

Dr. Fulton moved that the report of the Committee on Reporting Typhoid Fever be accepted, and the Committee discharged. Carried.

The foregoing papers on typhoid fever were then discussed by Drs. Hayne, Douglas, Tuttle, Guiteras, Dowling, Guilfoy, Boyd, and Porter, of Louisiana.

9. The Treatment of Baltimore Drinking Water by Calcium Hypochlorite, by Dr. William Royal Stokes, and Dr. Frank W. Hachtel, Baltimore, Maryland.

Discussed by Drs. Bryce, Perkins, Wood, and Brooks.

10. Child Hygiene, by Prof. E. Hernandez and Dr. D. F. Ramos of Havana, Cuba. Discussed by Drs. Snow, Simpson, and Dresslar.

On motion of Dr. Rankin, the meeting then adjourned.

Robert M. Simpson,
President.
Wm. C. Woodward,
Secretary.

Second Day.

Havana, Cuba,
December 6, 1911.

The meeting was called to order in the Ateneo, at half past nine o'clock, a.m., by the President.

By unanimous consent the reading of the minutes of the preceding meeting was dispensed with.

The Executive Committee submitted the reports of the Committee of Seven, as follows, with a recommendation that it be adopted:

REPORT OF COMMITTEE OF SEVEN.

To the Executive Committee:

In compliance with Article V, Section 4, of the Constitution, the Committee of Seven respectfully submits the following report:

On October 6, 1910, the Committee unanimously elected as Chairman

Dr. Robert M. Simpson, President of the Association and *ex officio* a member of the Committtee.

On October 10, 1910, Dr. John N. Hurty, appointed by the Executive Committee a member of the Committee on Journal, having declined to serve as a member of that committee because of the condition of his health, Dr. Ernest C. Levy was appointed by the Committee of Seven to fill the vacancy.

On October 10, 1910, the Executive Committee having adjourned without having fixed the time for the meeting to be held in 1911, the Committee of Seven fixed the time for said meeting, December 4th to 9th inclusive.

October 13, 1910. The Committee of Seven accepted the tender of the services of the following residents of Havana, as the Local Committee on Arrangements, the committee having been organized by the Secretary of Sanitation of Cuba:

LOCAL COMMITTEE ON ARRANGEMENTS.

Dr. M. Varona Suarez, *President.*
Dr. Juan Guiteras, *Vice-President.*
Dr. Federico Torralbas, *Secretary.*

Dr. Jose A. Lopez Del Valle.
Dr. Eugenio Sanchez Agramonte.
Dr. Gabriel Custodio.
Dr. Pedro Sanchez Del Portel.
Dr. Emilio Martinez.
Dr. Enrique B. Barnet.
Dr. Francisco Solis.
Dr. Joaquin L. Jacobson.

Dr. Aristides Agramonte.
Dr. Julio Arteaga.
Dr. Carlos Kohly.
Dr. Juan Santos Fernandez.
Dr. Alberte S. De Bustamanto.
Dr. Jose A. Presno.
Dr. Enrique Nunez.
Dr. Bernardo Moas.

October 14, 1910. Dr. Charles A. Hodgetts, who was elected by the Executive Committee to serve as a member of the Committee of Seven, having been found ineligible because of the expiration of his term of service as a member of the Executive Committee, the Committee of Seven appointed Dr. Wilmer R. Batt to fill the vacancy.

November 10, 1910, the American Public Health Association having been invited to affiliate with the National Municipal League, composed of organizations formed to secure the improvement of municipal governments, and of individuals interested along the same lines, the Committee of Seven, on behalf of the Association, determined that such affiliation was inexpedient.

December 3, 1910. The Committee of Seven having by amendment to Chapter 10 of the by-laws made at the Milwaukee meeting been authorized to make such changes in the by-laws as might be required to adapt them to the rules and regulations of the United States Postal authorities, amended Chapter 7 of the by-laws so as to read as follows, and respectfully submits its action for ratification by the Association:

CHAPTER 7. ANNUAL FEE.

The annual fee in each class, except the honorary, in which there is no fee, shall be three dollars. Any member desiring, however, to receive the papers, reports, and the transactions of the Association printed the official organ of the Association (which, during the remainder of the calendar year 1910, shall be the American Journal of Public Hygiene) shall be entitled to do so upon the payment of a subscription price of two dollars per annum.

No member, of any class, shall be entitled to enrollment at an annual meeting, to a badge of membership, or to the privileges of any class, until his dues are paid to date, except that if arrearages exceed two full years' fees, payment for two past years and the present year shall restore him to full standing.

February 17, 1911. The Committee of Seven ratified the action of the Secretary with respect to the custody of bound volumes and reports, providing:

1. That the volumes then on shelves in the office of the State Board of Health of Ohio be counted and cased.
2. That the cases containing back volumes be opened, the volumes sorted and repacked, moldy or injured volumes to be placed to one side for final disposition.
3. That where over one hundred books of any one volume exist these volumes be packed separately in cases marked "surplus."
4. That all cases be marked or stenciled legibly with a key number or letter and that a record be made of the cases and the number of books of each volume contained in each case, etc.

The above work to be done at a cost of approximately twenty-five dollars, plus the cost of any new cases that might be needed for packing. The Managing Editor was authorized to transport to the new headquarters of the Journal, at the expense of the Association one hundred copies of each volume of papers and reports, and to store the remaining copies in Columbus on the most favorable terms that he might find feasible.

March 25, 1911. The Managing Editor having reported that in sorting and arranging the stock of papers and reports of the Association, 249 copies were found damaged by water and of no value except for old paper, and that of certain volumes 869 individual quarterly numbers were found over and above those necessary to make complete sets, the Committee of Seven authorized their sale as old paper.

March 26, 1911. A meeting of the Committee on Journal, at the expense of the Association, was authorized.

April 6, 1911. The Committee thanked certain members of the Association residing in New York for the efforts such members had made toward procuring financial support for the Journal.

April 10, 1911. The Committee of Seven authorized the sale of the several volumes of papers and reports and of essays at the rates given below and the sale of the entire series of papers and reports in so far as the series was then in the custody of the Association at a flat rate of $65.00, and authorized the Secretary to use his discretion with respect to reductions from said flat rates to be made as the number of available volumes diminishes.

Volume	Price	Volume	Price	Volume	Price
1	$2.50	13	$1.00	25	$1.00
2	1.00	14	1.00	26	1.00
3	....	15	1.00	27	2.50
4	2.50	16	1.00	28	3.50
5	3.50	17	1.00	29	2.50
6	3.50	18	1.00	30	5.00
7	2.50	19	1.00	31	5.00
8	1.00	20	2.50	32	5.00
9	1.00	21	2.50	33	5.00
10	1.00	22	1.00	34	5.00
11	1.00	23	2.50	35	5.00
12	1.00	24	1.00	..	....

April 20, 1911. The Committee ratified a tentative arrangement made by the Managing Editor with Messrs. Spahr and Glenn, of Columbus, Ohio, giving into their custody, without expense to the Association, certain volumes of papers and reports of the Association, which Messrs. Spahr and Glenn agreed to forward to purchasers as authorized by the proper officers of the Association.

September 16, 1911. The Committee authorized the F. P. Kaiser Publishing Company, of St. Louis, Missouri, for purposes of publication, to make representative extracts from papers in the series of copyrighted prize essays published by the Association, proper credit to be given to the author and to the Association.

September 21, 1911. The Committee authorized that arrangements be made for the publication of the papers and reports of the American Public Health Association, presented at the Milwaukee meeting, in a bound volume as heretofore, the issue to consist of 150 copies, to be published at a cost not to exceed thirty cents per page, with binding at a rate of not more than thirty cents per copy.

September 26, 1911. The Committee authorized the translation and printing of the blank form of application for membership in the Association, the circular of information relative to the Association, and a circular on the preparation of papers, in Spanish, so as to facilitate the diffusion of information concerning the Association, in Mexico and Cuba.

December 4, 1911. The Committee of Seven audited the accounts of the Treasurer and found them correct. These accounts as reported by the Treasurer to the Association show receipts and expenditures during the year, and the cash in hand on November 14, 1911.

ROBERT M. SIMPSON,
President.
WM. C. WOODWARD,
Secretary.

Havana, Cuba, December 5, 1911.

Dr. Guion moved that the Report of the Committee of Seven be adopted, with the proviso, however, that the following words in the amendment to the by-laws adopted by the Committee of Seven, be stricken out: "which during the remainder of the calendar year 1910 shall be the American Journal of Public Hygiene". Carried.

Dr. Guion moved that Chapter 10 of the by-laws be amended by inserting the following words

> "The Committee of Seven shall have the power to make such changes, and such changes only, in the by-laws of the Association as may be required to adapt them to the rules and regulations of the United States Postal authorities. Such changes as the Committee of Seven shall make shall be presented to the Association at the next regular meeting for ratification."

The Chairman stated that under the provisions of Chapter 10 of the by-laws, the amendment proposed by Dr. Guion would have to lie over for at least a day, and that in the meantime, without objection, it would be referred to the Executive Committee. There being no objection, it was so referred.

The Exectutive Committee reported that at the 1910 meeting more than ten members of the Association had requested the establishment of a Section on Sanitary Engineering, and that a Committtee had been appointed then to inquire into the feasibility of organizing such a section. In view of the remoteness of the place of meeting, that committee had thought it best not to undertake to organize the section this year. The Executive Committee recommended, however, that the conditional organization of a Section on Sanitary Engineering provided for at the 1910 meeting be made definite and that the Association by formal action establish such a section, requesting those interested in its establishment to proceed as soon as possible to its formal organization.

Dr. Bryce moved that the report of the Executive Committee be adopted. Carried.

The Executive Committee reported that the Sociological Section made no provision for the election of officers at the Havana meeting to serve the ensuing year and recommended that the Association by vote continue in office those officers of the Sociological Section who were elected at the 1910 meeting, as follows:

Chairman, Mr. John M. Glenn, New York, N. Y.
Vice Chairman, Mr. Lawrence Veiller, New York, N. Y.
Secretary, Mr. Frederick Almy, Buffalo, N. Y.
Recorder, Dr. W. F. Snow, Sacramento, Calif.
Council.
Dr. Peter H. Bryce, Ottawa, Canada.
Dr. George W. Goler, Rochester, N. Y.
Dr. Herbert D. Pease, New York, N. Y.
Dr. Frank F. Wesbrook, Minneapolis, Minn.
Mr. A. M. Wilson, Philadelphia, Pa.

Dr. Snow moved that the report of the Executive Committee be adopted. Carried.

The report of the Committee on Membership, duly approved by the Executive Committee, was submitted, showing that the applicants named below were eligible to election to the classes specified, and recommended such election.

December 6, 1911.

ACTIVE.

NAME	ADDRESS
Ascanio, Ramon, M. D.	Havana, Cuba.
Barnet, Enrique B., M. D.	92 Aguila street, Havana, Cuba.
Browne, William Ward	157 Williams street, Providence, R. I.
Codino, Manuel, M. D.	26 8th street, Havana, Cuba.
Cowan, Cristino F.	30–32 Empedrado street, Havana, Cuba.
Cabrera, Eugenio A., M. D.	Havana, Cuba.
Davis, William H., M. D.	23 Beaumont street, Boston, Mass.
de Fuentes, Alberto S., M. D.	Havana, Cuba.
Dominquez, Alfredo G., M. D.	P. O. Box 1131, Havana, Cuba.
Dominques, Manuel M., M. D.	Havana, Cuba.
Dowling, Oscar, M. D.	New Court House Building, New Orleans, La.
Fernandez, Francisco M., M. D.	Havana, Cuba.
Finley, Carlos E., M. D.	Havana, Cuba.
Hicks, John R., M. D.	Covington, Indiana.
Jordan, German A., M. D.	4161 Lindell Blvd. St. Louis, Mo.
Le Roy, Jorge, M. D.	Havana, Cuba.
Maloney, John B., M. D.	Louise Maloney Hospital, Key West, Fla.
Mendizabal, Gregorio, M. D.	Mexico City, Mexico.
Mohr, Charles A., M. D.	252 St. Anthony street, Mobile, Ala.
Pena, Jose M., M. D.	Havana, Cuba.
Pina, Juan M., del, M. D.	Pinar del Rio, Cuba.
Recio, Alberto, M. D.	Havana, Cuba.
Ross, George F., M. D.	617 West Gaston street, Greensboro, N. C.
Taboudela, Jose A., M. D.	Havana, Cuba.
Turnbull, A. R., M. D.	1 River street, west, Moose Jaw, Sask., Canada
Vergara, Manuel, M. D.	Puebla, Mexico.
Woodworth, Elizabeth A., M. D.	3201 Clinton avenue, Minneapolis, Minn.

ASSOCIATE.

Babcock, Robert P.	State Capitol, Austin, Texas.
Boyd, William A., M. D.	1710 Hampton street, Columbia, S. C.
Figueras, Jose A., Ex. D. D. S.	Havana, Cuba.
Porter, Joseph Y., Jr. M. D.	Key West, Fla.
Smith, Claude A., M. D.	City Hall, Atlanta, Ga.

Dr. Guion moved that the Secretary cast the ballot of the Association for the applicants whose names had been presented by the Committee on Membership. Carried unanimously.

The Secretary having cast the ballot of the Association for the applicants named above, they were declared duly elected.

The Committee on Publication, through the Secretary, *ex officio* Chairman, reported that its work during the year had been uneventful, and that the publication of 6 of the papers read at the 1910 meeting, elsewhere than in the organ of the Association, had been authorized.

The Report of the Committee on Journal was submitted by the Chairman, Dr. Levy, as follows:

December 6, 1911.

The Committee on Journal begs to submit the following reports:

The Executive Committee of the A. P. H. A., at a meeting held in Waukesha, Wis., on September 9, 1910, appointed the following as the Committee on Journal, in pursuance of a resolution adopted by the Association at the Milwaukee Meeting:

Dr. J. N. Hurty,
Dr. H. W. Hill,
Dr. G. T. Swarts,

with Dr. R. M. Simpson, President of the Association, and Dr. Wm. C. Woodward, Secretary of the Association, as members *ex officio*.

The declination of Dr. Hurty to serve as a member of the Committee having been subsequently received, the Committee of Seven appointed Dr. E. C. Levy to fill this vacancy.

The Committee held its first meeting on November 18, 1910, in Buffalo, N. Y., Drs. Swarts, Hill, and Levy being in that city on the invitation of and at the expense of the New York State Board of Health. There were present at this meeting Drs. Swarts, Hill, Woodward, and Levy.

Dr. Woodward announced that, on motion of Dr. Simpson, the Committee of Seven had appointed Dr. Levy Chairman of the Committee on Journal. Dr. Levy stated that he was most unwilling to assume this very important office but that he did so in order that the meeting for which the members were then assembled might be held, there being then no opportunity to obtain another appointment by the Committee of Seven.

The Committee on Journal elected Dr. Woodward Secretary of the Committee.

The terms of office of the three appointed members, not having been designated by the Executive Committee, were determined by lot as follows: Dr. Levy, 1 year; Dr. Hill, 2 years, and Dr. Swarts, 3 years.

The Committee appointed as Managing Editor, Mr. L. R. Rickards, at an annual compensation of $1200.00, and 50% of the net profits accruing to the Journal for advertising, from subscriptions outside of the A. P. H. A., and from the publication of transactions of other Associations.

A second meeting of the Committee on Journal was held May 1, 1911, in Champaign, Illinois, to determine certain important future policies of the Journal. There were present at this meeting Drs. Simpson, Hill, Woodward, and Levy. The Managing Editor, Mr. Rickards, was also present.

Dr. Simpson's contribution of $250.00 to defray the cost of this meeting, has already been gratefully acknowledged by the Association at its present session.

In the month of February, 1911, a group of members interested in the success of the Journal put in motion a plan for securing from members of the Association guarantees for funds for the Journal. This plan was undertaken without consultation with the Committee on Journal, and when later submitted to that Committee, was not endorsed by it.

A meeting of the Committee on Journal was held on December 2, 1911, on the train between Jacksonville and Knight's Key, en route to the present meeting. Present, Drs. Simpson, Swarts, Woodward, and Levy. Dr. Hill signified by letter his inability to be present, as did also the Managing Editor.

The chief business of this meeting was the consideration of the report of Mr. B. E. Bramble, who had been employed by the Committee to audit the accounts of the Managing Editor. This report covered the 10 months ending October 31, 1911, and shows:

Cash received on account of the Journal		
Cash received	$1424.77	
Accounts receivable	518.15	
Subscription of Dr. Simpson	250.00	
Total amount received and receivable		$2192.92
Expenditures and outstanding liabilities on account of the Journal:		
Salary of the Managing Editor		$1,000.00
Printing		2,052.09
Expenses of Urbana meeting		231.04
Incidentals		177.44
Liabilities for unearned payments for subscriptions and advertisements		478.99
Total expenses of Journal		$3,939.56
Less total amount received and receivable		2,192.92
Net cost of running Journal for 10 months		$1,746.64

If it be assumed that the cost of conducting the Journal for the last two months of 1911 will be at the same rate as for the first 10 months, the total cost for the year will be $2,095.97. This represents, in effect, the cost of publishing the papers and transactions of the American Public Health Association.

Respectfully submitted,

E. C. Levy,

Chairman, Committee on Journal.

Wm. C. Woodward, *Secretary.*

Dr. Levy moved that this report be referred to the Executive Committee. Carried.

The Secretary reported that difficulty had been experienced in organizing the Committee on Trust Funds, provided for in one of the amendments to the constitution adopted in 1910, owing to some misunderstanding as to the duties of the committee.

Dr. Bryce moved that this matter be referred to the Executive Committee with the request that it report back to the Association such a resolution, if any, as it deemed necessary. Carried.

The Secretary announced that the meeting of the Advisory Council would be held in the Ateneo, at eight o'clock, p.m., December 7th, and the membership of the Advisory Council was announced.

The amendments to the constitution and by-laws proposed at the 1910 meeting were then taken up for consideration.

> Amend the constitution, Article 3, Section 6, by adding "and to such others as the Executive Committee may recommend as presenting satisfactory qualifications in lieu of the three years' service specified above."

Dr. Wright moved that the article of the constitution referred to be amended so as to provide that there shall be but one class of members, active, and that verbal changes be made in the constitution and by-laws wherever necessary to make them conform to Article 3 in its amended form. Duly seconded.

Dr. Freeman raised the point of order that Dr. Wright's motion was not germane to the amendment to the constitution as submitted at the 1910 meeting and as now under consideration, and that it was, therefore, out of order.

The Chair ruled against the point of order.

Dr. Woodward moved that further consideration of this amendment be postponed until the morning session, December 7, and that the Executive Committee be requested to consider the matter carefully before that time and to report to the Association at that meeting its judgment concerning the situation. Carried.

The second pending amendment to Article 3 was then taken up for consideration, said amendment being as follows:

Add to Article 3, to be known as Section 8, as follows: and make such verbal changes in the constitution and by-laws as may be necessary to conform therewith:

"Section 8. Any federal, state, or municipal department, bureau, or service, and any association or other organization, in any of the countries represented in this Association, engaged in the conservation and promotion of public health, may, upon application, be elected to membership in the same manner as any person, and shall thereupon have all rights, privileges, and obligations of other members, and shall be entitled to participate in all proceedings of the Association through a delegate duly authorized in writing for that purpose. Duly appointed delegates from such departments, bureaus, services, association, or other bodies may present papers approved by the Program Committee of this Association and engage in the discussion of papers read at its regular meetings, and members of such departments, bureaus, services, associations, or other bodies may receive the publications of this Association upon such terms as may be agreed upon by its Publication Committee."

Dr. Freeman moved that this amendment be adopted. Carried unanimously.

The pending amendment to Chapter 5 of the by-laws, as follows, was then taken up for consideration.

Amend the by-laws, Chapter 5, by adding after "present" the following:

"Provided, however, that during the interval between any two meetings of the Association any applicant whose application has been reported favorably by a vote of not less than two thirds of the Committee on Membership, may, by unanimous vote of the Committee of Seven, be elected to membership and such applicant shall become a member upon the payment of the annual dues for the current year."

Dr. Swarts, acting under instructions from the Executive Committee, moved that this amendment be amended by striking out the words, "two-thirds" and inserting in lieu thereof, "two members," and by striking out the word "unanimous" and inserting in lieu thereof, the words "a majority," so as to make the amendment, as follows:

"Provided, however, that during the interval between any two meetings of the Association any applicant whose application has been reported favorably by a vote of not less than two members of the Committee on Membership may by a majority vote of the Committee of Seven be elected to membership, and such applicant shall become a member upon the payment of the annual dues for the current year."

Dr. Freeman moved that the amendment as amended be adopted. Carried unanimously.

Papers were then read as follows:

Measures taken by the Cuban Government to prevent the introduction and spread of cholera in Cuba, by Dr. Juan Guiteras, Director of Public Health, Cuba.

Measures adopted by the United States Government to prevent the introduction and spread of cholera in the United States, by Dr. John F. Anderson, Director, Hygienic Laboratory, United States Public Health and Marine Hospital Service.

The three papers named above, all pertaining to Asiatic cholera, were discussed by Drs. Snow, Swarts, Kean, Bryce, and Guiteras.

Passenger Inspection, by Dr. Antonio Cueto, Special Medical Inspector, Havana, Cuba.

Disinfection in Havana, by Dr. Gabriel Custodio, Chief of Disinfection, Havana, Cuba. Discussed by Dr. Dreyfus.

A study of air and contact infection at the Providence City Hospital, by Dr. Charles V. Chapin, Superintendent of Health, Providence, Rhode Island. In the absence of Dr. Chapin, this paper was read by Professor Gorham. Discussed by Dr. Guiteras.

The report of the committee on the education of the public as to the communicability and prevention of gonorrhea and syphilis. Discussed by Drs. Schenck, Dowling, Snow, Mohr, Woodward, Guiteras, and Swarts.

The meeting then took a recess until 8 o'clock p. m.

The Association was called to order at half past eight o'clock, p. m., in the Ateneo, the President in the Chair.

Addresses of welcome were delivered as follows:

On behalf of the Republic of Cuba, by Hon. Dr. Manuel Varona Suarez, Secretary of Sanitation and Charities.

On behalf of the Medical Profession, Dr. Juan Guiteras.

On behalf of the Local Committee, Dr. Federico Torralbas.

On behalf of the United States of America, Col. W. C. Gorgas.

On behalf of the Dominion of Canada, Dr. Peter H. Bryce.

On behalf of the Republic of Mexico, Dr. G. Mendizabel.

The president of the Association then delivered his annual address.

The meeting then adjourned.

Robert M. Simpson,
President.
Wm. C. Woodward,
Secretary.

(The minutes of the meetings of the third and fourth days will be published in the July issue of the Journal.)

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

(*Abstract of Proceedings.*)

The April quarterly meeting of the Massachusetts Association of Boards of Health was held at the Hotel Brunswick, Boston, Thursday, April 25, 1912, President Henry P. Walcott presiding.

On the report of the Executive Committee the following new members of the Association were elected: Edmond F. Cody, M. D., City Physician of New Bedford; Edwin H. Place, M. D., Boston; R. M. Raymond, M. D., Chairman of the Framingham Board of Health; C. J. Carr, M. D., of the Framingham Board of Health; W. P. Coues, M. D., of Boston; James H. Walsh, M. D., Bacteriologist of the Fall River Board of Health; Edwin O. Childs, Jr., of the Newton Board of Health.

COMMITTEE REPORTS.

Report of Committee on Milk Legislation.

Mr. Bolling. Mr. Chairman, the Committee on Milk Legislation desire to report that the bill introduced at the present session of the Legislature is tabled in the Senate awaiting the final disposition of House Bill 2124, the so-called "Meaney Bill," which has been reported favorably by the joint committees of Public Health and Agriculture. This latter bill to an extent incorporates among its provisions the powers asked for in the bill presented by authority of this Association. The Meaney Bill is now before the House Committee on Ways and Means.

Report of the General Legislative Committee.

Mr. Bolling. The General Legislative Committee desires to report that the several bills criticised at the last meeting of this Association, viz., bills providing for appeals from decisions of local boards of health and for a re-organization of the State Board of Health have been given leave to withdraw by the Committee on Public Health, the acceptance of which reports by the Legislature has disposed of these matters for the present year.

A bill introduced by Dr. Richard C. Cabot, providing for the earlier reporting of births by physicians and midwives and the daily report of same by the city or town clerk or registrar to the local board of health, has been enacted, and as you probably all have been notified is Chapter

280 of the Acts of 1912. Your committee was pleased to aid in the passage of this bill.

The bills introduced by the Salem Board of Health and the Women's Municipal League of Boston, petitioning that authority be granted local boards of health to make rules relative to keeping of food stuffs, etc., were incorporated in Senate Bill No. 371, which was enacted April 8.

An act signed by the Governor on April 15 gives more comprehensive powers to local boards of health relative to licensing of stables.

There is nothing now pending of general interest to local boards of health other than the several bills pertaining to the inspection of milk.

Report on Method of Nominating Officers.

Dr. Denny. The report of the committee appointed at the annual meeting to consider the question of changing the method of nominating officers of the Association:

The Constitution of the Association provides that the officers shall be elected at the annual meeting, but it does not prescribe the method of nominating or electing the officers. It has been the custom of the Association to have the Nominating Committee appointed at the annual meeting by the president, or in his absence by the presiding officer of the meeting. The nominating committee thus appointed retires during the course of the meeting, makes its nominations and, returning to the meeting, gives its report.

The work of the committee is of necessity hurried, as they must report before the adjournment of the meeting. They have no opportunity to consult with other members of the Association, or even to get the consent to serve of the men they wish to nominate.

Your committee, therefore, feels that it would be a distinct advantage to have the nominating committee appointed at the October meeting. The committee would then have an abundance of time, and a ballot could be printed and mailed to all members with a notice of the annual meeting.

Another change which we should like to suggest is a plan which has been found to work well in other societies, and that is, to allow nominations to be made for any office by ten or more members of the Association. Thus, on a request signed by at least ten members, any name may be put on the ballot together with the nominees of the nominating committee to be voted on at the annual meeting.

As the method of nominating and electing the officers is not prescribed by the constitution or by-laws of the Association, it would seem to be permissible to change the method of making the nominations simply by vote of the Association. Therefore, if the Association favors the changes suggested in this report, we would propose the following votes:

(1) That the committee for the nomination of officers be appointed at the October meeting by the chairman of that meeting.

(2) That nominations may be made for any office by ten or more members who make the request in writing to the nominating committee at least three weeks before the annual meeting; the nominations thus made, together with the nominations of the nominating committee shall be printed on a ballot to be sent by the secretary to the members with a notice of the annual meeting.

F. P. Denny,
F. M. Kennedy,
G. E. Bolling.

Moved and seconded that the report of the Committee on Method of Nominating Officers be laid on the table until the next meeting. The motion was carried.

Papers Presented.

The following papers were then read:

The Development of a Municipal Laboratory by Mr. G. E. Bolling, of Brockton.

Statistics Regarding the Increased Number of Throat Infections in Boston during February, 1912, by Dr. William P. Coues, Boston.

(These papers are printed elsewhere in this number.)

Further Business.

Dr. Washburn. Mr. President, at the last meeting of the Association, I think it was upon my motion, a legislative committee of three was appointed. Since that time it has seemed advisable, if it could be done, that the legislative committee appointed at that meeting should be merged with our Milk Legislation Committee, in order to prevent duplication of work. I therefore move that our Milk Legislation Committee and our General Legislative Committee be merged.

Doctor Washburn's motion was seconded and carried.

Mr. Whiting. Mr. President, some time ago the Boston Board of Health undertook a revision of its rules in regard to the delivery of milk to houses in which there exists an infectious disease. It seems to me that that subject is of even more importance now than then, inasmuch as much milk is now delivered to customers through stores and there is no provision for the handling of those empty packages which come from infected houses served through the store trade. I would therefore suggest, being a matter of interest, I think, to this Association representing local boards of health, that the subject of making regulations for delivery of milk to such houses be left to a committee to be appointed by the Chair, the report to be made at the next meeting.

Mr. Whiting's motion was seconded and carried.

Retirement of Doctor Durgin.

Mr. Coffey. Mr. President, it seems to me that we ought not to break up today without putting on record in some way our appreciation of the work that has been done for this organization by our First Vice-President, and also putting on record our expression of regret that before this organization meets again he will have severed his connection with the health department of the city of Boston. Whether this is generally known or not, I do not know,—it has been in the public press. At all events, before we meet again our First Vice-President, Dr. Durgin, will have voluntarily severed his connection with the Boston Board of Health and will close a career of more than forty years in that capacity. Those of us who were at the birth of this organization know how much he did for it. Those of us who have manned one of the oars know how great a work he did to build this organization up and make it what it is and what it has been. It seems to me that we ought to put on record today our regrets for Boston, Massachusetts, and this organization, and general sanitation, too, that he is about to sever his direct connection with the preservation of the public health.

I understand, too, that soon after he closes his official career he intends to cross the water. The recent calamity has made known to us how hazardous, after all, that trip may be; how puny, when the Almighty raises his hand, are the efforts of humanity to meet the perils of the sea; and it seems to me that we ought to express here today our wishes for a safe passage and a happy return to us.

I hope and trust—and I feel sure you all will echo my words and agree with me—that when he returns we will see him here at our meetings and that we will have the benefit of his knowledge and his experience and his advice in the future for a great many years as we have had in the past.

My own indebtedness to him has covered nearly a generation. When I, not much more than a mere boy, was appointed health officer in Worcester, I came to Boston looking for information. I have found him for nearly a generation a fountain of knowledge, experience and advice, and I have not the least doubt that all the other health officers of Massachusetts have found him as I have, that same fountain of knowledge and experience. I never yet came to him looking for knowledge or advice that I did not get it in the most kindly and in the fullest manner. As I said before, my indebtedness to him is very, very great, and I never shall forget his kindness to me and his help to me. And so I say that the whole

State of Massachusetts ought to regret the severance of this veteran from the work of sanitary science.

I move that this organization put on record its regret that our First Vice-President is about to sever his connection with the health work of the city of Boston, and also its wish that he may have a safe passage and a happy return to our shores.

(The motion was seconded by several members.)

THE PRESIDENT. In putting Mr. Coffey's motion I should like to say simply two words: that I have known Dr. Durgin longer even than he has known him, that I know that we are losing from the port of Boston the ablest health officer in the United States, unquestionably (applause), and that I know in the next place, having served with him and Mr. Coffey in this Association from the beginning, that it owes more to Dr. Durgin for its success, for the interest you have taken in its meetings, than to any other single man. Will you adopt the motion proposed by Mr. Coffey? All those in favor will rise. (Everybody rose.) There is nobody else can rise; it is a unanimous vote.

DR. KENNEDY. This is a good time for each one personally to express himself as to the qualifications of Dr. Durgin as a sanitary expert and public official.

Dr. Durgin's courtesy is unfailing and his wise counsel so often sought by the New Bedford Board of Health is highly appreciated and followed by the board.

The President of this Association has just said, and I have heard it said by others, that throughout the country Dr. Durgin is known as the foremost sanitarian.

DR. DURGIN. Gentlemen, after saying to you that I am taken somewhat by surprise I am tempted to say that had I anticipated anything of this sort today I would have been tempted to be busy at my office. But I thank you for your kind expression. (Applause.)

The President appointed Dr. Bailey of Cambridge to serve as a member of the Sex Committee on account of the resignation of Mr. Kruesi. The President appointed Dr. Slack, Dr. Coolidge, Dr. Coues and Messrs. Bolling and Whiting as the committee to take up the subject of making regulations for the delivery of milk to houses in which there exists an infectious disease.

PRELIMINARY REPORT OF THE COMMITTEE ON METHODS OF CHEMICAL MILK ANALYSIS

Read before the Laboratory Section American Public Health Association, Havana, Cuba, December, 1911.

To the Members of the American Public Health Association.

Your committee begs to submit the following preliminary report:

Milk solids: Evaporate 5 gms. milk over boiling water in flat bottomed dish for two hours; cool and weigh.

Mineral matter: Ignite above residue at red heat to white ash; cool and weigh.

Determination of fat: Babcock method.

Milk sugar. (a) Optical method: Polarization of filtrate obtained by action of mercuric nitrate solution or of mercuric iodide solution upon milk. (b) Gravimetric method: Place 25 gms. milk in a 250 c.c. flask, add 0.5 c.c. 30 per cent. acetic acid; shake. Allow to stand for a few minutes, add about 100 c.c. boiling water; shake; add 25 c.c. alumina cream; shake and set aside for 10 minutes. Filter through a wetted ribbed filter, use wash water and make filtrate and washings up to 250 c.c. Act on this reducing sugar solution with copper sulphate solution and aklaline tartrate solution, and from the weight of the resulting cuprous oxide determine the amount of lactose present from tables of Munson and Walker, page 243, Bulletin 107 revised, Bureau of Chemistry, U. S. Department of Agriculture.

Added water: Acetic acid, Zeiss immersion refractometer method; also Lythgoe's method, employing copper sulphate solution for obtaining a clear filtrate for subsequent examination by immersion refractometer. By acetic acid method, 208 known purity samples gave refractometer reading in every instance above 39.0°.

Dirt: Heat milk in water bath to 45°C. Dirt collected upon thin layer of absorbent cotton by passing milk through percolator (latter may be made from liquor bottle by removal of bottom. For this purpose the bottle is then turned upside down.) Cotton plug held in place by inserting it into percolator by means of a cork stopper, through which a hollow glass tube passes, to permit escape of milk. If filtration is slow, it may be hastened by suction, using a side neck filtering flask. Dirt collects on cotton; free latter from milk by means of a little water. Plug of cotton with adhering dirt dried may be preserved indefinitely.

Graduated glassware: Endorsement of standard adopted by Association of Official Agricultural Chemists, recommended. The committee suggests the advisability of having the neck of the Babcock bottle of such a diameter that a volume of 2 c.c. shall not occupy more than 70 millimeters or less than 55 millimeters.

JAMES O. JORDAN,
Chairman.

BOOK REVIEWS

Dusty Streets and Tuberculosis. *A partial review of "Mortality from Consumption in Dusty Trades," Bulletin 71, of the Bureau of Labor, United States Department of Commerce and Labor. By Frederick L. Hoffman. March 1909.*

This Bulletin is misleading in that it conveys an impression regarding the seriousness of street dust as a disseminator or contributory cause of tuberculosis which is not supported by the evidence.

There are two reasons alleged for considering street dust dangerous. 1st. That it contains vast quantities of tubercle bacilli, derived from consumptives spitting on the streets. 2nd. That the irritating qualities of the dust itself contribute to keeping the mucous membranes in an inflamed condition, and so extra-susceptible to any infection with tuberculosis which may be received from any source.

The first, that street dust is full of tubercle bacilli, has been exploded pretty definitely in the last few years. This bulletin itself admits that such bacilli are not found living in street dust. Further quotations of authorities on this subject may be offered, but in view of this admission are unnecessary.

We are therefore restricted to the second factor,—the influence of irritating dust from the streets in injuring the mucous membranes.

Let us admit at once that this is plausible, and then let us take the actual figures of this report, and see if the plausibility is supported into an actuality. We are not as serious professional public health men, interested in what *may* by some flight of the imagination be conceived of as a possibility, but in what *is* in truth, a fact. Nor are we greatly concerned with how the 1% of cases of disease *may* be contracted, but with how the 99% *are* contracted.

The first table of this bulletin deals with consumption amongst street cleaners. These persons are selected as peculiarly exposed to street dust. The author himself states that his data are not entirely conclusive; but it can be shown that they are meaningless.

Our author gives the percentage of deaths from tuberculosis to deaths from all causes amongst street cleaners as 18.3. He then compares this with the similar percentage amongst *all males in the whole registration area.*

It is obviously wholly unfair to select a single class of city dwellers (street cleaners) a poorly housed, poorly fed, and unprogressive class at best—and to compare them with the population of the whole registration area, including the rural districts.

The only fair comparison would be with the *same* class of city dwellers, *not* exposed to street dust. In the census lists, "porter and helpers (in stores)" seem to be nearest to the condition of street sweepers in physique, pay, manner of homelife, etc., and are *not* similarly exposed to street dust.

Unfortunately the street sweepers table cannot be compared directly with the porters table because they relate to different periods. It is sufficient to note that the street cleaners table is based on such meager figures that had one additional death been from consumption rather than from other causes, at age 25–34, this one death would change the percentage from 44 to 50; that the reverse difference, reducing the consumptives deaths by one would change the percentage from 44 to 39, and that seven less deaths in the total would reduce the high figures for street cleaners to the level of that for the *whole registration area.* A table in which such small changes can so greatly affect the results is surely not a table on which to base final deductions.

Turning now to the second item; drivers, teamsters, hackmen, etc., are selected by the author of the Bulletin as illustrating another class much exposed to municipal dust.

The Bulletin states as follows:

"Drivers and teamsters perhaps more than any other class of outdoor workmen are exposed to the risk of considerable and continuous inhalation of municipal dust. By reason of the usual position of the driver's seat, perhaps 8 feet or more above the ground, the degree of exposure is however much less than in the case of street sweepers and refuse collectors."

The author goes on to enumerate other disadvantages of this class—low wages, long and uncertain hours, sitting in a fixed position for long periods, night work, temptations to dissipation, and the fact that the ranks of this class are often recruited from failures in other lines of endeavor.

Despite these admitted peculiar disadvantages of this class, the writer compares the percentage of tuberculous deaths amongst them, not with that of a similar class, nor with that of city dwellers of any class, nor even with city dwellers as a whole, but again with the percentage for *the whole registration area*.

"Drivers, teamsters, hackmen, etc.," should be compared with a class exactly similar to them, if possible, with the exception of nonexposure to street dust, if the influence of street dust is to be thus determined, and not with a huge mixed population of lawyers doctors, clergymen, farmers, etc.

I have been able to secure figures for 1909, comparing "porters and helpers (in stores, etc.)" with "draymen, hackmen, teamsters, etc." (Bulletin 108, Bureau of the Census Mortality Statistics for 1909, P. 133.) Here we have two somewhat comparable classes, distinguished chiefly by this—that one class is out in the street dust pretty continuously, the other working about between the street and indoors, but a good deal indoors. The figures follow.

Percent of deaths from consumption to deaths from all causes amongst Porters and Helpers (in stores) and amongst Draymen, Hackmen, Teamsters, etc.

Ages.	Porter, etc.	Draymen, etc.
25–34	38.3	35.8
35–44	31.6	29.3
45–54	21.6	18.2
55–64	10.3	10.2
	27.4	25.4

Here we find in totals and at every age that the "porters and helpers" exceed the "draymen, hackmen, teamsters, etc.," in the per centage of tuberculous deaths.

The total percentage for street cleaners as given by Mr. Hoffman is 21.1 per cent. Now note the sequence.

Taking the gross totals as thus derived, it appears that the highest percent is amongst "porters and helpers," the next lower amongst "teamsters and drivers," the lowest among street cleaners; that is—*the deaths from tuberculosis on this basis* DIMINISH *as the exposure to municipal dust* INCREASES.

Watchmen, policemen, firemen, etc., are surely exposed to municipal dust—quite as much as draymen and teamsters. Moreover on the principle advanced by the writer of this bulletin, the policemen at least should be more exposed since being on foot he is nearer the ground.

The figures for 1909 are for this group 24.2, 17.8, 9.5, and 4.9 using the same age groups or a total percentage of 19.0, which falls below any of the others. It will at once be claimed that this class is a selected class, strong physically, well fed, well cared for. This is of course true. *But is it any more unfair to select this class, an exceptionally fine body of men, to illustrate the non-effect of municipal dust, than it is to select teamsters, cabmen, etc., an exceptionally poor body of men, to illustrate the converse?*

Please let me emphasize the point that I am not disputing the allegation that street cleaners and cab drivers suffer a high percentage of attack from tuberculosis. What I do insist on is that in view of all we know of tuberculosis, it is not quite fair to attribute the high percentage to street dust, when there are so many other factors at work. Only an enthusiast for the principle that street dust produces consumption could comfort himself with such evidence as is presented here. The Bulletin itself quotes Thomas Oliver regarding these very men to the effect that alcoholism and exposure to cold are responsible for their tendency to develop gout and rheumatism, and *through these diseases*, to *secondary* affections of the lungs, heart and respiratory organs. Municipal dust is certainly not a cause of alcholism, of exposure to cold, of gout or of rheumatism.

There are many other points which go to

show that other factors than dust are at work. For instance, *rural* draymen, hackmen, etc., (Part 1, Census of U. S. 1890) show a tuberculosis death rate of only 105 per 100,000 living;* while *city* draymen, hackmen, etc., show a rate of 363 per 100,000 living, yet the *rural* draymen, hackmen, etc., surely encounter dust as much as do the *city* draymen, for in the cities the streets are more or less cleaned and watered while in the country neither is done.*

It is a striking fact that miners and quarrymen whom we usually think of as peculiarly exposed to dust, show percentage figures for tuberculosis deaths compared with deaths from all causes far below any other class, boatmen, and sailors coming next. On the other hand, painters, plumbers, boot and shoe makers, printers, tailors, bookkeepers, clerks and copyists, bartenders and others show figures as high or higher than the draymen, at least at the active periods of life. Steam-railroad employees surely have the most continuous exposure to dust in the sense of irritating particles in the atmosphere, of any ordinary outdoor occupation, yet their tuberculosis percentage is very low.

But my statistics based on these percentages are no better than those of the author of the Bulletin, because *the tables on which this Bulletin bases its conclusions and the ones I have used above, are the very tables concerning which the Census Bureau specifically warns everyone not to base such conclusions.* Mortality statistics for 1908, p. 79 says:

"The relation of occupation to mortality is one of the most important and also one of the most difficult subjects of vital statistics . . . the tables presented in the present report (1908) have been prepared . . . more particularly to pave the way for more complete and accurate statistics of the mortality of occupations than have heretofore been available."

P. 87. "The greatest caution must be exercised in the use of tables VII to XII—"(tables of the very type used by Mr. Hoffman,)" and emphasis must be placed upon a thorough understanding of just what they do and do not mean, and for what they may or may not be used."

The Census Bureau then goes on to point out the fallacies involved in comparing the *percentage of deaths from one disease to deaths from all causes* in one occupation, with similar percentages for other occupations, giving the reasons therefor, and indicating specifically that although 41.2 per cent of tailors deaths from tuberculosis and but 5.3 per cent of the deaths of miners and quarrymen, were from the same disease *it does not follow that the death rate from tuberculosis i. e. (deaths from tuberculosis per total employed persons) of the lungs is in reality lower amongst the miners and quarrymen than amongst the tailors.* Since Mr. Hoffman has used these very tables to show just what the Census Bureau says they do not and cannot be used to show, his main argument falls to the ground.†

It seems clear then, 1st, that the evidence offered is untrustworthy in itself, and ad-admitted to be so by the author; 2nd, that it can be made to prove the exact reverse of the alleged conclusion; 3rd, that the use of the evidence presented to estimate relative unhealthfulness of occupations has been condemned for this very purpose by no less an authority than the actual compilers of the tables themselves—*i.e.*, the United States Census Bureau; 4th, that the author himself quotes Oliver to the effect that tuberculosis amongst hackmen, etc., is *secondary* tuberculosis—*i.e.*, secondary to other affections which are not due to dust at all.

There are at work factors far more direct and unequivocal in influencing these rates than the mere exposure or non-exposure to dust.

Chief amongst these is opportunity for infection, *i.e.*, close unguarded association with previous cases. The lumberman closely associates, in the bunk and mess houses, at evil-smelling close-quarters, with other people. He contracts readily all those infectious diseases, smallpox, typhoid fever, etc., *to which he is exposed.* But he does not contract tuberculosis because he is not exposed to it. Why is he not exposed to it? Because the people a lumberman comes in contact with have not open tuberculosis. They could not "hold their jobs" if they had. Therefore the lumberman escapes. The miner also lives in evil surroundings, from a sanitary standpoint. He is not, like the lumberman, much in the open air; he constantly encounters dust and dirt and filth. Like the lumberman he contracts all diseases that result from contact, but he does not contract tuberculosis because he does not associate with open cases.

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* The estimates based on deaths per 100,000 living are unequivocal, while as is shown later, comparisons based upon the percent which one cause of death is to all causes, is quite fallacious.

† It is easy to understand the fallacy. If in a given occupation there is a total of 1000 deaths, including 10% from tuberculosis, the percent of tuberculosis is 10%; but if only 500 died from all causes including the 100 from tuberculosis, the *same 100 deaths* from tuberculosis would be 20% of the total.

The city dweller, whatever his personal habits or his home life, is constantly encountering swarms of people. He is in contact, more or less intimately, with more different new people in a day than a lumberman or a miner or a farmer is in a month. Hence he contracts tuberculosis with greater frequency.

Poverty alone, poor food alone, alcoholism alone or all these combined, are helpless to produce tuberculosis without infection, and infection is a matter of intimate association with sources of infection. Why wait until poverty and alcoholism are abolished, good food provided, municipal dust vanquished and all the other dreams of the millenium accomplished, instead of taking hold definitely of the one essential inevitable factor, without which these things cannot produce tuberculosis, and with which riches, temperance and good food are powerless to prevent tuberculosis—*i.e.* the infected person? Why harp upon, make much of, campaign against and spend money for what is like dust at most only a 1% possible contributory factor in, while wholly neglecting the open case which is the 99% factor?

H. W. Hill, M. D., D. P. H.

Director, Division of Epidemiology, Minn. State Board of Health.

Sewage Disposal. *By George W. Fuller, Consulting Engineer and Sanitary Expert, Member of the American Society of Civil Engineers. Octavo, 767 pages, amply illustrated with tables, plans, and cuts. Cloth, $6.00 net. McGraw-Hill Book Company, Publishers, New York. 1912.*

Mr. Fuller's book has been heralded for some time through advance publication of certain chapters, and those interested in the subject, have awaited its appearance with pleasurable anticipation. Mr. Fuller would of course produce a good book but the actual production comes as a pleasant surprise even to those who know him best and expected the most from him. Apart from other considerations, one naturally asks, "When did a busy engineer find time for such a work?" The answer is the keynote of the book. It is not a thing apart from the author's professional life; it is of that life—a mere transfer to the printed page of the author's extensive knowledge as it lies in orderly arrangement in his own mind.

It is a well proportioned admixture of the experiments, the readings, and the ponderings of a student; and of the works and the experience of the designer and builder; a work which few would undertake and fewer still accomplish.

Mr. Fuller begins his treatment with a discussion of the fundamentals, the chemistry and bacteriology of sewage. Here is a well discussed compilation of existing data. The significance of the various items of a chemical analysis; the mutual relations of population, volume of sewage and strength; and the daily and seasonal variations, are considered. The sludge problems which form such an important part of subsequent chapters is introduced here as a physical and chemical property.

The older methods of analysis are thus summarized,

"But, generally speaking, the results of such tests are a disappointment, as they show but little as to the character or source of deoxygenating properties of the organic matter, and about which knowledge is needed for the advancement of the art of sewage disposal."

The newer views of the oxygen requirements of a sewage, which Mr. Fuller himself recognized as early as 1903, are treated extensively and brought up to date.

The bacteriology of sewage is treated from two viewpoints, the purely biological and the public health. Fermentation and putrefaction are discussed at length. Following Herter, they are regarded as generic terms, referring to the chemical and not to the aerobic and anaerobic conditions. Fermentation is the bacterial cleavage of carbohydrates, putrefaction, of proteid and allied substances. This view is further supported by quotations from Kendall. Decomposition of organic matter in general, as treated by Nichols, Drown and others and of sewage matter itself; nitrification and denitrification; and the reduction of sulphur compounds, are treated as bio-chemical rereactions. The following is a typically concise statement of terms often misused.

"So long as available oxygen is present the sewage is fresh. When anaerobic decomposition begins it is stale. For a time it is the soluble organic matter that is then decomposed through the protoplasmic activities of the bacterial cells. Sooner or later enzymes are excreted by the anaerobic bacteria and these soluble products proceed to liquefy and gasify suspended organic matters. This is spoken of as the septicization of sewage." Chapter III on odors is a practical application of some of the principles laid down.

From the public health standpoint sewage bacteriology relates to epidemics of waterborne diseases. A concise review of these is followed by a statement of the Washington results, "Hazen's theorem," and some apparent exceptions in New Jersey cities where mechanical filtration is employed. A striking result at Cincinnati is given in full and Dr. Landis' view that the mortality in other than hitherto recognized water-borne diseases is unaffected by improvement in the water supply seems hardly to be supported by the figures.

A chapter devoted to shellfish is most complete and worthy of separate publication. Under the heading "Position of State Authorities" however one is surprised to find no reference to the extensive work of the Rhode Island Shell-fish Commission.

In chapter VI the problem of Sewage Disposal is attacked. To illustrate its diversity certain typical cases are discussed in detail. The following chapter deals with experiment stations, their results and their limitations.

"Experimental data from a combined engineering, chemical and biological viewpoint have been a powerful factor in promoting efficiency and economy in sewage disposal projects. Particularly was this true some years ago, when it was out of the question to secure data from works in practice. Their utility is less now than formerly, and designing engineers now look more to results of operation on a large scale. But the establishment by tests on a small scale of underlying principles of sewage disposal, even if meager sometimes as a guide to completely satisfactory designs, has been of notable aid in the advancement of this field of sanitary science."

The chapter on dilution is exceedingly valuable. There is a complete summary of all important investigations of this most vital subject. Bodies of water are properly regarded as a resource, to be conserved. Their proper use for sewage disposal, must eventually by found to lie between the two extremes of gross pollution and pristine purity. In no other field of sewage disposal is scientific study so urgently needed and so piteously lacking. The author's compilation of data valuable as it is, only emphasizes the lack of real knowledge and even of any real scientific method of attack.

Special treatment is given to the matter of dilution in large lakes, involving new problems, and the attempts of the various lake cities to solve their problems are given in detail. Similarly the sea-board cities are cited. The treatment of the New York harbor situation is especially full and leads up to a discussion of recent work upon oxygen diffusion, and reaeration.

With chapter XII the treatment becomes more strictly engineering, although throughout, the theoretical and fundamental view point is maintained. The mass of compiled material in design, efficiency and cost lends itself poorly to the purposes of a review. Suffice it to say that each of the kinds of sewage treatment is taken up and discussed fully with statistical references to all that is good in the literature. Here are treated in order, screening, sedimentation, chemical precipitation, electrolytic treatment, strainers and colloidors, irrigation, sand, contact and sprinkling filters, aeration, hypochlorite treatment, ozone, and residential plants.

A comparative summary closes the book. Here Mr. Fuller warns against standard methods of treatment and by inference against the too prevalent practice of copying successful works without careful study of conditions. He divides methods into well established, recently developed, limited, waning and unestablished. Comparative efficiency and cost are taken up and the chapter closes with a plea for good management supported as usual by citations of actual cases.

The book will become a standard authority, in America at least. It is the result of a continuous experience with the problem since the early days of its scientific study and combines with it a full statement of the author's personal experience and resulting views, a compilation of data which will prove invaluable to the practicing engineer.

Earle B. Phelps.

Home Nurse's Handbook of Practical Nursing. A Manual for use in Home Nursing Classes, in Young Women's Christian Associations, in Schools for Girls and Young Women, and a working text-book for mothers, "practical" nurses, trained attendants, and all who have the responsibility of the home care of the sick. *By Charlotte A. Aikens, Author of "Hospital Management," "Hospital Training-School Methods," "Primary Studies for Nurses," "Clinical Studies for Nurses," 12mo of 276 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1912. Cloth, $1.50 net.*

"By the most fundamental of all laws," says Charlotte A. Aikens in the preface of her book entitled Home Nurse's Handbook of Practical Nursing, "women are the nurses of the world. Few, if any women escape the care of some sick or helpless one. All women have the responsibility of the nursing of health in the home, or the prevention of disease."

Miss Aikens' book fills a distinct need in its effort to instruct young women, married and unmarried, in the details of home nursing. It is a lamentable fact that most of the knowledge which mothers acquire with regard to nursing of children and of adults has been picked up from sources which are to say the least, questionable in character and in accuracy of technique. Many hours of pain and suffering, much physical labor, the prevention of needless disease, and the general improvement of health in the home would result if mothers were competent nurses.

Miss Aikens' book is not an attempt to give a detailed course in nursing. The book is written primarily for classes of young women in churches, schools and elsewhere, who wish to study the problems which will confront them in later life. It is written in the form of a text-book, but this fact does not detract whatever from its readability, nor from its value as a handbook in the home.

The book is filled with practical suggestions concerning the care of the sick and concerning the prevention of disease. For instance, very few young women or mothers know what things are necessary to have ready in the home in case of sickness, or concerning the proper method of making a bed or of handling an invalid. The feeding of the sick is a question, upon which the average housekeeper has very little information. The giving of baths and the preparation of packs, both hot and cold, the every-day care of the baby, the giving of medicines, bandaging in case of accident, and the all important subject of maternity nursing,—these are but a few of the numerous topics with which Miss Aikens' book deals.

There is no attempt in the book, however, to provide home treatment without a physician. The home nurse, as much as the registered nurse, needs the skillful direction of the physician to make her nursing of value.

Philip P. Jacobs.

HEALTH DEPARTMENT REPORTS

State of New York.

The preliminary extract of the 1911 report of the New York State Department of Health made by Commissioner Eugene H. Porter points out the necessity for more adequate quarters for the State Laboratory, particularly in regard to the manufacture of antitoxin. Previous recommendations as to the necessity for revision of the state health laws are renewed.

The first report of the work done under the new Cold Storage Law is presented. The majority of the cold storage warehouses have shown a disposition to fully comply with the provisions of the statute, several however had to be prosecuted—particularly in regard to the matter of stamping goods received in and delivered from storage. Several concerns were prosecuted and convicted, the most important case being that of the Greenwich Cold Storage Company of New York, which after the case was brought before the Court of Special Sessions in the City of New York, was fined $400, and the contention that the act was unconstitutional rejected.

Educational work in Oral Hygiene has been successfully carried out and a third lecturer had to be appointed to assist in the work on account of the demands received from many sections.

The Division of Sanitary Engineering has continued its admirable work on the protection of water supplies and the problems of sewerage and sewage disposal.

Of particular interest is the work done in connection with the sanitary conditions of summer resorts. The state was divided into thirteen summer resort districts and careful studies made of the many popular resorts in the state. The names and location of those resorts where the proprietors failed to eliminate insanitary features after repeated notices are published in the monthly bulletin of the Department or in the press. It is interesting to note that the Department annually receives many requests from vacation seekers concerning the sanitary status of the resorts. This is indeed a sign of the times.

The death rate for the state was 15.5 per 1000. There were actually 2,091 less deaths reported in 1911 than in 1910. Dr. Porter says that it is safe to say that the largest contribution to morbidity as well as mortality during the year was epidemic influenza; 1700 deaths were reported as directly due to this disease, but this represents only a few of the deaths from other causes which were indirectly due to or hastened by influenza. Cancer death rate increases steadily and it looks as if within twenty years there will be more deaths from cancer than from consumption.

The report is extremely instructive, sound and well written, and offers good evidence of the valuable work being accomplished by Dr. Porter and his associates.

Milwaukee, Wisconsin.

The annual report of the Health Department for 1911 differs very materially from those issued in the past years. The report is of a much more popular nature, and the many illustrations which are included must make it of greater educational value to the citizens of Milwaukee. Considerable attention is paid by Dr. F. A. Kraft, the Health Commissioner, to the Milwaukee water situation. It will be remembered that various experts have stated, that, in their opinion based on very careful studies of the water supply, the Milwaukee water supply which is obtained from Lake Michigan, should be purified because of the fact that at certain times when the wind is blowing from the south, the sewage of the city readily finds its way to the water intake. Dr. Kraft points out that during the year he has endeavored by the issuance of reassuring statements to quiet the unduly alarmed public concerning the danger of the water, and that he deems it senseless and wrong to excite fear of a condition against which the public is helpless. He evidently recognizes that the water supply is polluted, and in his report urgently recommends the Council to take immediate steps to install a sterilization or purification plant and for this purpose recommends that an ozone plant be erected. The expert engineers recommended filtration of the Lake Michigan water, but Dr. Kraft is very sceptical with regard to the merits of this method of purification, and states that "this scepticism arises out of a knowledge of the experience of other cities, particularly the city of Pittsburgh which expended more than $10,000,000 to perfect a plant now in operation there and not yet a bacteriological success."

Considerable work has been done during the past year on Factory Inspection and in many instances systems to remove dust and fumes have been installed and many other improvements brought about. Between six and eight hundred bubbling drinking fountains have been installed in factories. Reference is made to the new housing Commission recently appointed, and the prediction is made that many of the evils now existing will be done away with. Mr. F. W. Luening, the head of the Bureau of Education and Publication of the Department makes an interesting report. The monthly bulletin of the Department started by Mr. Luening has increased its circulation from six hundred to eight thousand, and Mr. Luening's Bureau designed and executed the first Public Health Exhibition in Milwaukee. This Exhibition was extremely well prepared and was very successful.

Over six thousand bacteriological examinations were made in the Bacteriological Laboratory, and the Bacteriologist, Dr. Ruhland, as the result of his bacteriological analysis of the water states that B. coli was found in 44.69 of one cubic centimeter samples.

The death rate per thousand was 12.32 as against 13.90 for 1910. There were 561 cases of typhoid fever reported as compared with 1605 during 1910, and there were decreases noted in both scarlet fever and diphtheria. Tables are given in the statistics showing the contributory causes of death as well as the principal cause. The report includes that of the Child Welfare Commission. This Commission amongst other things, has been making a special effort by concentrating all known methods for the prevention of infant mortality in a certain section of thirty-three blocks of the city, to see what improvement could actually be brought about. This experiment is now being carried on and the constant watchful supervision that has been exercised over those babies born in this district seems to have resulted in a marked decrease in the infant death rate. During the last quarter of 1910, there were 128 births in this special district, and during the the same period of 1911, 158. The death rate per hundred births for this period in 1911 was 4.4% as against 12.5% in 1910. Further reports of this work will be awaited with much interest. Wilbur C. Phillips is Secretary of this Commission.

PUBLIC HEALTH NOTES

Canada's Protest.

The Commission of Conservation of Canada has recently issued a number of publications dealing with the further diversion of water from Lake Michigan for the Chicago Drainage Canal. These reports go into the question most fully, and should be read by all interested in this important international question.

The "Conclusions" as set forth on behalf of the Canadian Government are as follows:

1. That there is no imperative necessity for such a large diversion of water from Lake Michigan for sanitary purposes, as is requested in the application.

2. That the historical facts presented in this brief show conclusively that the Sanitary canal cannot be considered as the outgrowth and development of a scheme which has received recognition by the United States Government, or that of the Dominion of Canada.

3. That the claim that the Sanitary District is entitled, as a matter of right, to the use of so much of the waters of Lake Michigan as may be necessary for sanitary and domestic purposes, cannot be entertained in so far as it relates to the extraordinary and wasteful use proposed.

4. It has been shown that very substantial injuries have been, and are being suffered by navigation interests. Fears for future and more extensive damages, by reason of increased diversion, are exceedingly well founded, and justify the demand that some improved method of sewage disposal which shall not require the abstraction of any considerable quantity of water from Lake Michigan nor the diversion of other outlets of waters which would naturally flow into it, be adopted.

5. That the Dominion of Canada has the right to a voice in the disposition of the waters of lake Michigan for sanitary purposes in so far as such diversion injuriously affects navigation, because her citizens are accorded, by treaty, the right of free navigation in that lake, and, in that no diversion can be made without injuriously affecting her harbours, channels and canals.

6. It having been shown that the sewage of Chicago can be so treated and disposed of by other means than the present dilution methods, by which great quantities of water are withdrawn from lake Michigan and discharged through the Drainage canal into the Illinois river, it is contended, on behalf of Canada, that the abstraction of water from lake Michigan shall be limited to such quantity as shall not injuriously affect navigation interests on the Canadian side of the boundary, and, that such limitations shall take effect at the end of such time, as, in your judgment, may be reasonably necessary for the Sanitary District to install, and put into use, the works which may be required for disposing of the sewage by other means than by the dilution method now in use.

7. That, in view of the fact that the Sanitary District claim that permits hitherto issued deal only with the flow through the lower portion of the Chicago river, and that it has the right to take any amount of water, without permission, through the canal, provided it is supplied through other feeders, it is respectfully requested that all permits be only for such limited quantity of water as shall not injuriously affect navigation on the lakes and St. Lawrence river, and be so worded as to state the total quantity which the Sanitary District of Chicago may be permitted to withdraw for domestic and sanitary purposes from the drainage basin of lake Michigan.

International Congress on Industrial Accidents.

"The third International Medical Congress on Industrial Accidents is to be held in Dusseldorf from the 6th to the 10th August, this year. Previous conferences have taken place at Liege (1905) and Rome (1909), and the published proceedings of these have provided an immense amount of valuable information respecting this important modern branch of medicine and surgery. The questions to be submitted for discussion this year are exceedingly practical, and such an international exchange of views as will be provided should be of material assistance in concentrating and adding to our knowledge in this branch of study. They are as follows:—

(1) Comparative study of the Compensation Acts in force in various countries.

(2) Importance of early institution of functional treatment in cases of industrial accident.

(3) Traumatic diseases of the heart and blood vessels.

(4) Traumatism and arthritis deformans.

(5) Productive and aggravating influence of trauma on cancer.

Although these subjects are purely medical and of particular interest to medical referees and medical officers of accident insurance companies, the membership of the Congress is not restricted to the profession, but is thrown open to representatives of insurance companies and associations of employers or workpeople. Whilst it is hoped that a good number of British representatives will visit Dusseldorf, anyone interested may become a member and thus secure a copy of the proceedings without actually attending the meetings. The propaganda work for this country is being undertaken by the Association of Certifying Factory Surgeons (Incorp.), the secretary of which will be pleased to answer any inquiries addressed to 16, John Dalton Street, Manchester. Prof. Liniger, Elisabeth Str. 63, Dusseldorf, is the general secretary of the Congress."

The Medical Officer, April 20, 1912.

The Cloak, Suit and Skirt Industry.

The May Bulletin of the Joint Board of Sanitary Control of New York in the above industry contains a summary of a year and a half's work. The marked improvements in fire protection and sanitation are well indicated and the Joint Board deserves to be highly congratulated on their work. Some of the achievements of the Board as given in the bulletin are as follows:

"The Board now has a sanitary survey of 1,884 shops compared with 1,738 in the second inspection and 1,243 in the first. This indicates marked progress in the gathering of *facts* of the industry with respect to unsanitary conditions.

"The number of shops with no drop ladders has been reduced from 236 to 38, or from 13 per cent. to 2 per cent.

"The doors opening in are still with us, but their number has been reduced from 97 per cent. in the first inspection to 79 per cent. on the second inspection and to 48 per cent. in the last. . . .

"The increase in the number of dressing rooms is indicated by the reduction from 79 per cent. of shops with no dressing rooms in the first inspection, to 58 per cent. in the second and 34 per cent. in the third.

"And progress in protecting the worker from eye-strain is shown in the fact that the shops unprotected from glare have been reduced from 83 per cent. in the first inspection to 72 per cent. in the second and 51 per cent. in the third. . .

"But most significant and reassuring is the statement that 25,336 persons, or 51 per cent. of the workers, are employed in shops having our sanitary certificate. This means that over one-half of the workers in our industry work in factories in which the standards of the Board are complied with."

The total expenditures for the fiscal year was $6,938.26. The cost of the inspectional staff was $3,084.75, and the average cost per inspection 32 cents.

The Board has recently started in on the physical examination of the workers of this industry. Other industries might well follow in the footsteps of this large business. The work is primarily preventive in character.

Public Health and Clean Up Day in Michigan.

The following letter has recently been addressed by Dr. R. L. Dixon, the Secretary of the State Board of Health of Michigan, to the cities and villages of that state.

"The most important asset subject to the principles of conservation is Good Health. The largest financial burden to the people of Michigan is that produced by disease. The diseases causing this output of money are PREVENTABLE DISEASES. The most important principle of prevention of disease is Sanitation. A proper degree of sanitation and hygiene consistently maintained will save thousands of lives and millions of dollars in this State each year.

"There are in Michigan each month over 200 deaths from tuberculosis. This disease costs us $20,000,000 a year. Add to this the cost of typhoid fever, diphtheria, smallpox, cholera infantum, and the long list of preventable diseases and the amount becomes appalling. This matter is practically within the power of public control.

"To the end that concerted activity, covering the entire state, may be established, his excellency, Chas. S. Osborn, Governor of the State of Michigan, has designated May 15, 1912, as Public Health and Clean Up Day in Michigan.

"In accordance with the spirit of his proclamation, the State Board of Health asks that it be made a day of general cleaning up of unsanitary surroundings, and the establishment of sanitary, healthful conditions. This will bring about an unmeasured good if entered into in the spirit which the movement deserves.

"We ask that Mayors of cities and Presidents of villages, through the co-operation of the local Boards of Health, extend the proclamation into every jurisdiction. It should be a day of special public health teaching in every school in the state. From every pulpit a sermon on good health might profitably be extended on the Sunday preceding. The newspapers might well anticipate the day by special editorials pertaining to the subject.

"If all concerned will participate in the work, it will mean an arrest of summer diseases which will be of untold value."

Emperor Honors the Memory of Dr. Koch.

In connection with the thirtieth anniversary of Dr. Robert Koch's announcement of his discovery of the tubercle bacillus, Emperor William of Germany has ordered that the Royal Institute for the Study of Infectious Diseases in Berlin, in which Professor Koch worked for ten years, should bear Koch's name hereafter. The emperor in his decree says:

"Professor Koch, by his discovery, opened the combat against the greatest scourge of mankind, which has been conducted since with unprecedented success and has made suffering humanity his eternal debtor."

Accident Prevention at the Remington Typewriter Works.

In the April numner of *Human Engineering*, Mr. John Calder, Manager of the Remington Typewriter works and widely known as an authority on accident prevention, gives a summary of the company's experience regarding accidents to employees for the past five years. The figures show a steady increase in the number of persons employed and the number of machines in use, attended by a steady decrease in the number of accidents. In 1911 the rate of accidents of all kinds per 1,000 employees fell to 24.4. It is a most encouraging showing, and should be an incentive to others with similar opportunities. To quote Mr. Calder:—

"The works include Brass and Iron Foundries, Annealing and Hardening Departments, and a large variety of dangerous machinery worked by males and females and operating upon wood, rubber and metal. Special attention is given to scientific safeguarding and safeworking of machinery, to the maintenance of these conditions and to supervision and instruction of the foremen and employees in accident prevention.

"During the five years no fatal accident occurred and no limbs or eyes were lost. The machinery accidents were almost wholly slight finger injuries. The non-machinery accidents were chiefly slight cuts and bruises, falls, scalds or burns.

During the five year period ending December 31st, 1911, the number of employees *increased* 66 % the number of machines *increased* 25 % and ACCIDENTS OF ALL KINDS PER 1,000 EMPLOYEES DECREASED 46 %."

The Increase in Industrial Accidents.

In an article with the above title in the March number of the Publications of the American Statistical Association, Dr. Henry J. Harris, of the Library of Congress, discusses whether or not the increase in the size and the complexity of our industrial establishments must inevitably be attended by a corresponding increase in the relative frequency of industrial accidents. After an interesting analysis of the evidence at hand Dr. Harris states in his general conclusions that:—

"In Germany, Austria, and Great Britain the serious accidents, namely those causing death or permanent disablement, show a tendency to decrease. In Germany and Austria, the accidents which cause disablements from which the workman eventually recovers, show a tendency to increase, there being no information on this point for Great Britain. In Germany there has been an elaborate, persistent campaign for at least a decade for the purpose of reducing the accident risk and in this period the number of accidents of the type which may be called 'minor' has steadily increased. The progress in the movement for reducing the risk of industry, therefore, has resulted in distinctly reducing the risk of death or permanant disablement, but has not yet diminished the risk of temporary disablement."

England's Tuberculosis Recommendations.

The Committee appointed by Lloyd George, Chancellor of the English Exchequer, to consider a constructive program for the prevention of tuberculosis under the new state insurance act, has issued a preliminary report.

The report recommends the establishment of dispensaries for diagnosis, and sanatoria, farm colonies and open air schools for treatment. For this purpose it is recommended that the funds provided by the insurance act be used in addition to a further sum provided by the finance act of 1911. The funds available from the insurance act will amount to $4,490,000 a year and the finance act provided a capital sum of $7,500,000, making a total of almost $12,000,000 for the first year.

The committee suggests tentatively that a dispensary is necessary for every 150,000 to 200,000 people in urban neighborhoods, or a possible total of 300 such establishments in the United Kingdom. In regard to sanatoria the committee believes there should be one bed for every 5,000 of population.

Housing Conditions in Paris.

"The natural advantages of Paris are equalled by few of the capitals of Europe. Situated on the banks of a river which flows rapidly enough to prevent stagnation, the ground rises gradually to the out-skirts. The citizens have not been slow, however, to effect artificial improvements, and especially during the past 50 years, since the time when Baron Haussmann constructed his magnificent boulevards, circuses, crescents, and open spaces. There still appears to be a great deal to be done to improve still further the conditions under which many of the inhabitants are living. The *Times* Paris correspondent recently gave an interesting account of the schemes which the Municipality has in contemplation with this end in view. A loan of £36,000,000 is being devoted to the embellishment of the city, the improvement of roads, the opening of new streets, and the construction of new school and hospital buildings.

There is a proposal to lay out spacious boulevards to run right round the city on the lines of the present inner fortifications and moats, which are now considered to be antiquated, dilapidated, and useless. A sum of £8,000,000 is to be expended in the erection of dwellings to be let at low rentals. Of this amount £2,000,000 may be lent to building societies which undertake to provide cheap working-class dwellings. Half of the buildings to be constructed must be let to families of French nationality in which there are more than three children. The rents of these are to be fixed at £12 per annum for four rooms, and £10 for three rooms, but families with less than three children will have to pay £16 and £13 respectively. Families of at least four children under 16 years of age will obtain a further reduction from 1 to 3 per cent. according to the number of children. A certain number of these houses are to be built in the central quarters of Paris in order that the tenants may be near to their work."

The Medical Officer, April 20, 1912.

Seamen and Tuberculosis.

"In his annual report, Dr. Herbert Williams, the medical officer of health for the Port of London, draws attention to the degeneracy of seamen on British ships. He says that the conditions under which seamen on vessels live are peculiarly favourable for the dissemination of pulmonary tuberculosis, and it would seem that, until the Legislature takes some more practical interest in the welfare of seamen, it will continue to be the cause of much mortality. Seamen can do little else but degenerate under the present conditions. They are shut up in quarters below deck which are practically in constant use as a sleeping, living, and dining room, and are generally dark, dirty, damp, and encumbered with clothing. In some of the smaller vessels the men have even to provide and keep their food in their quarters."

The Medical Officer, May 25, 1912.

Tuberculosis Death Rate Declines.

The National Association for the Study and Prevention of Tuberculosis has compiled from data abstracted from the Annual Mortality Reports of the Bureau of the Census a table showing how the death rate from tuberculosis declined in the decade 1901 to 1910 in the registration area of the United States. According to this table, the death rate from tuberculosis declined 18.7 per cent. in the 10 years, showing a steady downward trend, while the death rate from all causes declined only 9.7 per cent., the decrease being less steady. As this is the first ten year period for which annual mortality statistics are available for the registration area, these figures are significant. The complete table follows:

DEATH RATES FROM TUBERCULOSIS (ALL FORMS) AND FROM ALL CAUSES OF DEATH IN THE REGISTRATION AREA, UNITED STATES, FOR EACH 100,000 POPULATION, 1901 TO 1910 INCLUSIVE.

(*From data abstracted from the Annual Mortality Reports of the Bureau of the Census.*)

Year.	T. B. Death Rate.	Death Rate all Causes.
1901	196.9	1656.0
1902	184.7	1594.1
1903	189.0	1611.8
1904	201.6	1663.9
1905	193.6	1616.0
1906	180.2	1567.5
1907	178.5	1597.1
1908	167.6	1478.0
1909	160.8	1440.0
1910	160.3	1495.8
Decrease in death rate,	18.7%	9.7%

Appointments.

Doctor Wilmer R. Batt, State Registrar of Pennsylvania, has been appointed by Doctor J. N. Hurty, president of the A. P. H. A., to serve on the Committee on Vital Statistics of the American Medical Association, and Doctor D. L. Harris, St. Louis, has been appointed delegate to the Conservation Congress to represent the American Public Health Association on the Advisory Board.

An Important Tuberculosis Investigation.

Drs. MacKnight and Coon, two of the State Inspectors of Health of Massachusetts have recently conducted an investigation into what happens to patients released from State Sanatoria and Local Tuberculosis Hospitals (Monthly Bulletin State Board of Health, Mass., March, 1912). The following statements are made by the investigators with regard to their finds of various groups of cases investigated:—

Briefly stated, the investigation discloses the fact that 9 of the 27 patients discharged from a state sanatorium were known to be living, while 10 had died since leaving the institution, and 8 were at large without any knowledge of the fact by a local health authority. Of the 9 persons known to be living 3 are now inmates of a State sanatorium, while each of the remaining 6 is careless as regards the spread of infection. A striking fact which the investigation disclosed is that each patient returned from the State sanatorium as "an arrested case" was found on physical examination either in an advanced or moderately advanced stage of the disease.

The investigation further disclosed the fact that persons are discharged from State sanatoria to go whither they may. They sometimes return to their original place of residence, or they may seek new domiciles in the same city. They may never return to their original location, but may go to other cities or even other States, In any event it appears that no person or organization is responsible or assumes responsibility for the care and conduct of patients discharged from a State sanatorium.

It is a fact that most of the 27 patients investigated on leaving the sanatoria have been found to be careless in their personal habits, especially as regards the prevention of the spread of disease among well persons. They have thus failed to profit by the instruction received at the State hospitals.

Another fact made clear by the investigation and well illustrated by the experience of one patient is that some of the physicians who recommend sanatorium treatment are not sufficiently expert in making a proper diagnosis.

Still another fact made clear by the investigation is that a considerable proportion of the patients discharged from a State sanatorium as an 'arrested case' relapse immediately or shortly afterwards, into a condition of well-advanced sickness. On returning home the patients are generally left to their own resources.

A second group of 19 cases who had received treatment in a State sanatorium disclosed the following:

1. The absence of a strict supervision of tuberculosis patients who have had hospital treatment in a state sanatorium.

2. The need of local hospital provisions for the care and treatment of a certain proportion of cases.

3. Failure on the part of some physicians to report the disease.

4. Failure of local health authorities in some instances to follow up reported cases and see that the patients and the public are properly cared for.

5. The necessity of more practical coöperation between existing local and State authorities.

The third group of cases investigated were those discharged from the Lawrence Tuberculosis Hospital, 127 in all. The authors give their results as follows:—

"An analysis of the records of the hospital shows that 75 patients, 59 per cent. of all the patients discharged, have died; that the whereabouts or present condition of 17 patients are unknown; that 6 patients have, apparently, recovered; and that one person was decided not to have had tuberculosis.

"Of the remaining 28 cases now actively ill with the disease all but 4 were found living in tenements, and some amidst bad sanitary surroundings. With the exception of 2 instances especial precautions were not taken to prevent the spread of the disease.

"To none of the 28 patients had advice or assistance been given by the local board of health.

"Many of the patients were found out and about each day on the streets, in moving-picture houses and elsewhere, even though they were spitting promiscuously. One patient had returned to school, although having considerable cough and some expectoration and occasional hemorrhage. One patient went to work in a mill. Three of the patients had confirmed habits of intoxication.

"Each of these patients, now a menace to the public health, was at one time, as has been shown, under treatment in a municipal hospital. They have been allowed in many instances to return to crowded tenements and to unsanitary homes, and no successful attempt was made by local authorities to keep track of their whereabouts."

This paper brings up an extremely important point in tuberculosis prevention, and the findings of these investigators are most discouraging, indicating as they do the failure of the lessons learned in the hospital and sanatoria to be applied on leaving the institutions. Many of the serious considerations of tuberculosis control are indicated.

The Dangers of Picnics.

The Department of Health of St. Paul, Minn., in its April Bulletin issues a special warning against picnics and summer vacations in insanitary places. It is pointed out that many places where picnics are held are maintained in a grossly insanitary condition and that some are a positive menace to the health and life of those who patronize them. The warning to those considering picnics is especially directed against polluted drinking and bathing water, toilet arrangements, and garbage disposal.

Isolation of B. typhosis from Excreta.

Drs. Lumsden and Stimson in Public Health Report for May 24, 1912, contribute a short article on the examination of excreta for typhoid bacilli. They recommend a primary planting of both feces and urine on Endo medium and then fishing typhoid like colonies and inoculating on to Russell's medium (a 2 % agar to which has been added litmus, lactose and glucose). They state that "On Russell's medium inoculated in this way typhoid bacilli leave the surface of the medium blue but change the medium in the butt of the tube to a bright red; colon bacilli redden both the surface and the depths of the medium and cause the formation of gas bubbles throughout the depths of the medium; paratyphoid bacilli leave the surface blue, but produce redness and gas bubbles in the butt of the tube; dysentery bacilli leave the surface blue and change the medium in the butt of the tube to claret color quite readily distinguishable from the brighter and more pronounced redness produced by typhoid bacilli."

If any of the tubes of Russell's medium show a typhoid like growth, the culture is to be tested for agglutination with typhoid agglutinative serum, and "since typhoid bacilli just isolated from excreta may not agglutinate in as high dilutions as will stock cultures, the test for agglutination should be made with several comparatively low dilutions before deciding that it is negative." If positive agglutination takes place, the organisms are plated out to obtain a pure culture and then tested through the various cultural and biochemical tests to establish with certainty its identity.

Bacteria and Flies.

Dr. John C. Torrey contributes an article on Number and Types of Bacteria Carried by City Flies to the March number of the Journal of Infectious Diseases. He reviews briefly the general beliefs concerning the fly as an agent to spread disease and states that the work was undertaken "with the hope of gaining some additional light on the nature of the bacteria conveyed by flies." The flies were trapped in the laboratory, and the laboratory faces the rear of a row of tenements of the poorer grade with an intervening space of 75 feet. Dr. Torrey writes that "it seemed possible that flies might have picked up bacilli of the dysentery type from the soiled diapers of infants sick with infective summer diarrhea, for without doubt such dejecta were occasionally exposed to them. Examinations were made to show the number of organisms on the surface of the flies and also the intestinal bacterial content. The former varied from 470 to 4,400,000 bacteria per fly and the latter from 16,000 to 28,000,000. No evidence was found which would show an increase in the number of fecal bacteria within the intestine of the fly and no distinctive flora is developed as in warm-blooded animals."

Dr. Torrey summarizes his investigation as follows:—

"1. Flies examined up to the latter part of June were free from fecal bacteria and carried a homogeneous flora of coccal forms.

"2. During July and August there occurred periods in which the flies examined carried several millions of bacteria, alternating with periods in which the number of bacteria were reduced to hundreds. The scanty flora probably indicated the advent of swarms of recently hatched flies.

"3. Fecal bacteria of the colon type were first encountered in abundance the early part of July.

"4. The bacteria in the intestines of the flies were 8.6 times as numerous as on the surface of the insects.

"5. On the surface of the flies the colon group bacteria constituted 13.1 per cent. of the total; and within the intestine 37.5 per cent. of the total.

"6. Of the lactose fermenters, isolated and identified, 79.5 per cent. belonged in the colon-aerogenes group and 20.5 per cent. in the acidi lactici group.

"7. Fifteen cultures of streptococci, isolated and identified, were distributed among the equinus, fecalis, and salivarius groups. There were none of the pyogenes type.

"8. The most important isolations were three cultures of B. paratyphosus, Type A.

"9. Bacteria of the paracolon type causing a final intense alkaline reaction in litmus milk and fermenting only certain monosaccharids were frequently encountered during August."

Sterilizing the Croton Water Supply.

Although the quality of New York City's Croton water, supplying the boroughs of Manhattan and the Bronx, has in general been quite good, the city is now preparing to make assurance doubly sure by sterilizing the entire supply with hypochlorite of lime. The more immediate cause of this precaution seems to be the possibility of infection by workmen on the new Catskill aqueduct, which crosses the Croton water shed.

The installation, which is under construction at Dunwoodie where the new and old Croton aqueducts lie close together, is probably the largest of its kind yet attempted and will apply a little over 3 tons of commercial hypochlorite to 380,000,000, gallons of water each day. This is calculated to give 0.5 parts of available chlorine per million of water treated.

The solution of hypochlorite will be made up to a strength of 2 per cent. in solution tanks, and will be agitated with compressed air to secure uniformity. This solution will then be applied directly to the water in the aqueducts by perforated pipes, and mixing will be made thorough by an arrangement of baffle plates. The plant will probably be in operation this fall.

Eng. Record, Vol. 65, No. 22, June 1, 1912.

Purifying Thames Water.

"Purification of the Thames water by the addition of quicklime with subsequent dilution to render it potable is suggested by Dr. A. C. Houston of the Metropolitan Water Board of London, England. Dr. Houston states that 15 lb. of quicklime, costing about 3 cents, added to 7,500 gal. raw water would kill the B. coli, and inferentially but certainly the microbes of epidemic water-borne diseases, such as the typhoid bacillus. The excess of lime would then have to be neutralized with 2,500 gal. or one-third of the volume of adequately stored water to render it potable. In this way 75 per cent. of the water would be sterilized chemically and the remaining 25 per cent. sterilized by storage. Subsequent to this treatment, rapid filtration alone would be required to remove the precipitate of inert carbonate of lime and to bring the water up to a reasonable standard of chemical purity. He states that this system would be more expensive than sand filtration, but would have certain distinct advantages, notably its adaptability, its special suitabliity for flood waters, its capacity for flood waters, its capacity to render an initially foul water absolutely safe in a reasonably short space of time."

Eng. Record, Vol. 65, No. 22, June 1, 1912.

Boric Acid in Sausages.

"At the Blackburn Police-court, on January 26th, Messrs, John Wells & Co. were summoned for selling sausages that were not of the nature, substance, and quality demanded. A pound of sausages was purchased from the defendants on December 22nd, and on analysis were certified to conrain 63 grains of boric acid per pound. Dr. Greenwood, medical officer of health, stated that boric acid was particularly injurious in cases of indigestion, and in some forms of kidney disease would be positively dangerous. On being asked, in cross-examination, whether he knew the Manchester magistrates had dismissed a case relating to sausages that contained 70 grains of boric acid per pound, the witness suggested that those magistrates should have the sausages administered to them. On behalf of the defendants, it was stated that they had been making sausages for over forty years, and for about twenty-six years had used it as a preservative, as they found that otherwise the sausages would not keep. The chairman said the Bench did not think there had been any intention to deceive the public, but they felt compelled to convict, and inflicted a fine of £1 and costs."

Public Health, May, 1912.

The Treatment of Pulmonary Tuberculosis by Tuberculin.

Under the above caption the Lancet of May 11th discusses editorially the present status of tuberculin in relation to the treatment of pulmonary tuberculosis. After evaluating recent contributions to the literature of the subject by Doctors Wilkinson and Latham, the Lancet states its position as follows:—

"Treatment by tuberculin is a useful method of therapeutics, but it is foolish to decry all other procedures, especially the 'sanatorium.' No physician who has had experience with the various methods adopted will support such a view. Tuberculin is a valuable adjunct in the treatment of certain cases of pulmonary tuberculosis, but it must be used in conjunction with other methods if its full advantages are to be obtained. Combined with routine treatment in a sanatorium or other special institution, or at home if the surroundings are satisfactory, tuberculin, if carefully used, will yield valuable results. Tuberculosis cannot be eradicated, by sanatoriums, or by dispensaries, or by tuberculin, or by any single measure. It demands a mobilisation of all forces, medical and social. To advocate one system in contradistinction to all others is to delay progress and to discredit scientific research. The prominent attention that has been drawn recently to the use of tuberculin has been valuable, but substantial advance is more likely to ensue if it is admitted that cases of pulmonary tuberculosis vary so much, even in the early stages, that there is no one method which can generally be adopted."

VOL. II. JULY 1912 No. 7

AMERICAN
JOURNAL OF PUBLIC HEALTH

MEASURES TAKEN BY THE CANADIAN GOVERNMENT TO PREVENT THE INTRODUCTION AND SPREAD OF CHOLERA IN CANADA

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Read before the American Public Health Association, December, 1911, Havana, Cuba

Before detailing these measures, it may be of interest to cite the case of a cholera carrier we had at one of the quarantines of Canada last winter.

A case of Asiatic cholera presented itself on November 17th, 1910, at the Grosse Isle Quarantine Station, in the River St. Lawrence, Canada. It was the first case of this disease since its coming to that quarantine in the year of the Hamburg cholera epidemic, 1893.

Upon receipt of telegraphic information of the arrival of this case, I went to the station and took charge of the situation.

I found the vessel, the "Royal George," at the station, the patient landed, but any further action suspended on account of the gale that was raging. I learned that although during the voyage the foreign immigrants had been separated from the others, this had not been maintained until the end, but that they had been redistributed according to destination. On account of this mixing, and the occupation by the different classes of the forward and aft steerages alike, I deemed it necessary to land all the steerage passengers, 260 in number, and to disinfect both the forward and aft steerages.

The ship's hospital was disinfected by steam, the alleyways, latrines, etc., with mercuric chloride solution, and the steerages fumigated with sulphur dioxide. The vessel was then released. The landed passengers were held five days after disinfection. No subsequent case occurred; this proves the efficacy of the measures taken, the disease being confined to and stamped out at the quarantine station, as was done when it last appeared in 1893.

The history of the patient, as given me by himself, as far as the facts prior to his arrival are concerned, is as follows:—

Poulick (or Godlieb) Seide, aged thirty, left his home in the village of Michelsdorf, in the district of Vlodawski, in the province of Szedista, in Russia, on Tuesday, October 18th, 1910. He persistently asserted that there was no cholera whatever or anything resembling it in the country at or near his home in the village above named. He drove by team from his home to the town of Wlodawa, thence went by rail, two days' journey, to Libau. He had with him, in a basket, bread, sugar, tea, and boiled meat. He bought fruit at stations on the way to Libau. At Vrifzcz he bought four apples; ate them, and drank some beer. He had only the basket with the provisions referred to; and three shirts, bought about a fortnight before in the village store of Israel, at Michelsdorf; besides one "towel" or handkerchief.

In Libau he spent one day and one night at an emigrant boarding house, to which he was conducted by the agent of the steamship line. In this house there were also at the time some thirty more people, Russians, Jews, and others. He was examined by a doctor, and passed; his eyes having been looked at, and the skin of his forearm. His clothing and basket were not disinfected.

From Libau to London he was on a small Danish steamer for eight days, without any stops.

In London he was met and taken by team to emigrant boarding quarters, where there were many nationalities. He was there eight days. From there he went by bus to the depot. He was on train for two hours to Bristol, where he directly boarded the steamer "Royal George."

He was quite well during the first three days of the voyage, except for a little seasickness. On the fourth day, which was stormy, he vomited, and was very thirsty. During the first three days he had one stool a day. On the fourth day he had no appetite, and no stool. On the fifth day he had no vomiting, but drank continually, and had one or two stools. The sixth day—the third of sickness—was the same; no appetite, great thirst, no vomiting, two loose stools; no cramps in stomach, but pains in arms and legs which lasted till he reached Quebec. He vomited only once during the voyage, and that was, as stated, on the fourth day. He had diarrhœa until he arrived at Quebec. He had no retention of urine. He had two chills at the beginning; ate almost nothing but some of his own bread On the Danish steamer and in London he seems to have eaten the food prepared for him, but when he was ill on the "Royal George" he seems to have eaten and finished the bread which he brought with him in his basket. He had a friend, Gustav Yanke, from his own neighbourhood, who also had some provisions with him.

On arrival at Quebec at 9 a. m., on Thursday, November 17th, Seide's temperature was 102.9. At 2 p. m. it was 103.1. These temperatures were taken by Dr. Bailey, the United States immigration officer, before the ship was sent back from Quebec. The temperature of the patient when he was landed late that evening at quarantine was 101.2. On Friday, the 18th, his morning temperature was 101; his evening temperature 102.2. He had one stool. On Saturday, the 19th, his morning temperature was 101.4; his evening temperature, 101. Two stools. On Sunday, the 20th, his morning temperature was 99.3. One solid stool. The observations that occur to one in connection with this case are as follows:—

In the first place, we have the assertion of Seide that there was no cholera or anything resembling it at or near the place from whence he came; though he knew of its existence in distant provinces. None of his acquaintances or friends or anybody in his neighbourhood or in the districts through which he passed had anything to resemble the complaint which afterwards attacked him.

The period of incubation for Asiatic cholera as agreed upon by the International Health Conferences of Vienna and of Paris, and universally accepted by all sanitarians, is five days; yet here we have a man two days from his home to the port; at least a day there; eight days from Libau to London; eight days in London, and three days well on the ship; making a total of some twenty-one or twenty-two days between his departure from his home and the appearance of choleraic symptoms.

Suspicion is thus thrown upon the food that he was bringing with him; and the rush or grass basket, in which were his shirts and towel, and a few crumbled remains of bread, was sent to Dr. J. G. Adami, Professor of the Department of Pathology and Bacteriology, of McGill University, Montreal, to endeavour to establish whether they had been the cause of the mischief. It will have been noted that in Seide's report to me of his proceedings, he stated that he did not use his own provisions on the Danish steamer, and that he did eat the bread which he had brought with him in his basket, when his appetite failed at the beginning of his sickness on the "Royal George." It may therefore well be that in the transition from the cooking on the Danish steamer, which would more or less approximate to his own, to that of the boarding house in London, he may have found the English cooking less to his taste, and been therefore driven to the consumption of the food that he had brought with him. If that was contaminated, it would account for the late appearance of the attack. The only other explanation is that Seide was a "cholera carrier."

The case was a mild one, Seide never having reported himself to the ship's surgeon, and he remained up and about all the time, and walked ashore at Quebec with the other passengers.

The clinical picture of the patient Seide on and after arrival was as follows:—

Anxious expression, with pinched nose and cheeks, and lips blue. Temperature at 7.30 a.m. 103 F. Weak, thready pulse of 138, and complained of abdominal cramps and intense thirst. He said he had been unable during the five preceding days to retain any food in his stomach except a few bits of bread that he and his traveling companion had brought with them from their village in Russia, and at times had no control over bowels' movement. At no time during the whole voyage had he eaten any uncooked meat, vegetables or fruit, except the four apples purchased and eaten unpeeled between Wlodenski and Libau.

At two o'clock he had a first stool since seven in the morning, which was collected in a sterile vessel, from which specimens were sent to Dr. Adami at Montreal, and to the Hygienic Laboratory in Washington.

Some hot milk and Vichy water was fed to the patient during the day, which was retained.

When the ship left at 7.30 p.m., the temperature had gone down one degree.

When the patient arrived at the quarantine station, Grosse Isle, I examined him very carefully, and the following is what I noted:—

18th. General appearance not very good. Pinched nose and cheeks and lips blue. Good and strong pulse of 100. Gurgle in the right Iliac fossa. No spots on the body. Skin rather subject to transpiration. Tongue moist, trembling, and covered with a thick white coat, except the borders and point, which are red. Temperature, 102 2-5 F. Had one liquid motion during the night. Night temperature, 102 1-2.

19th. Seems much better, and asks to get up. Has a good and strong pulse of 90. Morning temperature 101 2-5; night one, 101 1-5. Had two liquid motions today. All the stools collected till now have the appearance of pea soup.

20th. Seems better, but complains of headache, sore throat, and pains in the shoulders. Good and strong pulse of 80. Morning temperature of 99 2-5; night one, 99 1-5. At night complains of severe pains in the shoulders and bladder. Had a very abundant transpiration of a very strong acid smell, after which all pains disappeared. Had his first solid motion today.

21st. Morning temperature, 98 1-5; night one, 99.0. No complaint of any kind except being very hungry. One solid motion.

22nd. Morning and night temperature normal. Was very hungry. One solid stool.

From that time the temperature continued to be normal and stools to be solid. On the 23rd we allowed him to get up. On the 24th he had some solid food for the first time.

As indicated, specimens of Seide's excretions were sent to Dr. Adami at Montreal for bacteriological examination. Dr. Adami, after detailing the steps and processes of his examination, gave the following as his conclusions:—

From the various characteristics, namely:—

I. The presence of abundant "spirilla" in the preparations made from the centrifugalized sediment;

II. The free growth of a curved, or "comma" bacillus or spirillum in Dunham's medium in eight hours, this form being present to the exclusion of others;

III. The identity of this form so growing with individuals of a known and tested strain of the cholera spirillum grown similarly and for a like period in Dunham's medium;

IV. The motility of the organism thus isolated;

V. The presence of a single flagellum at one pole;

VI. The milky semi-translucent colonies developing on the surface of peptone agar medium in 10–12 hours,—from these various characteristics, I am forced to the conclusion that the material forwarded contained the spirillum of cholera, i. e., the spirillum choleræ asiaticæ, and that the individual from whom this material or these dejecta were obtained was suffering from true or Asiatic cholera.

At the same time, a specimen of Seide's excretions was sent to the United States Hygienic Laboratory at Washington by Dr. Bailey, the United States medical inspector of immigrants at Quebec. A subsequent letter to him states: "I have to inform you that a negative report was made regarding this material by the Director of the Hygienic Laboratory, the statement being made that the material was too old for a proper test for the vibrios of cholera, five days having elapsed between the time of shipment and arrival at the laboratory."

The examination of the basket and its contents, which constituted all Seide's luggage, by Professor Adami, proved negative in its results, except in the case of the handkerchief or towel, which may very possibly have been infected during his recent attack or exacerbation.

Specimens of Seide's excretions were sent subsequently from time to time to Dr. Vallée, Bacteriologist at the Hotel Dieu Hospital and at the Municipal Laboratory, Quebec, who confirmed Professor Adami's conclusions, and who continued to find the cholera spirillum in Seide's excretions up to more than four months after his choleraic attack.

The fact was thus very clearly established that he was a so-called "cholera carrier." Owing probably to the quick death or recovery of cholera patients in epidemic times, no extensive researches have been made as to the continuance or persistence of the cholera spirillum in the excretions of convalescents from this disease. In the Hamburg cholera epidemic of 1892–93, Dunbar, however, discovered a typical cholera spirillum in the stools of twenty-eight apparently healthy individuals who had never shown signs of the acute disease. In October, 1910, also, a bacillus-carrier of this disease was detected at the New York quarantine.

The presumption would seem to be that this man Seide had the cholera spirillum of low virulence growing in his intestinal canal for at least the three weeks between his leaving home and his attack; and that when he became depressed or had his vitality and resisting powers lowered by the increased seasickness after the bad weather sprang up on the fourth day of his voyage from Bristol, the spirillum growing and multiplying rapidly induced an attack, which, though mild, bore all the earmarks of true Asiatic cholera.

Bacteriological examinations of Seide's excretions gave positive results all through December, January, February, March and up to the middle of April. After that, they were negative, and remained negative through the month of May. He was released from quarantine on the 30th of May, 1911, and was deported by the Immigration authorities on the 1st of June on the ground of defective mental powers.

On account of persistent threatening of cholera from Italy, and the establishment, by the case of Seide and others, of the possibility of cholera carriers, amongst the apparently healthy passengers arriving, a regulation was issued on the 27th of July in the following terms:—

"Circular to Quarantine Officers, the Commissioner of Customs, Ship Owners, Agents, and others concerned.

"OFFICE OF THE DIRECTOR-GENERAL OF PUBLIC HEALTH, OTTAWA, CANADA, JULY 27, 1911.

"*Sir or Sirs:*

"I am directed by the Honourable the Minister of Agriculture to inform you that, in order to diminish the danger of the introduction of Asiatic cholera into this country, he has issued the following orders:

"All steerage passengers arriving at ports in Canada from ports or places infected with cholera shall be subject to bacteriological examination at the quarantine station of the port and shall not be permitted to pass such station or to make customs entry, until it has been determined by such examination that they are not cholera-bacillus carriers. This regulation shall apply until further notice to steerage passengers from Italy coming directly or via intermediate ports.

"For all cholera contacts arriving on vessels upon which cholera has occurred, the period of detention under quarantine observation shall be 10 days, unless after 5 days' detention they are found not to be cholera-bacillus carriers.

"Your obedient servant,
"(Sd) F. MONTIZAMBERT,
"*Director-General of Public Health.*"

We have no lines of steamships running directly between Italy and Canada; but Italian passengers arriving from Italy through other countries have been bacteriologically examined in compliance with the above cited regulations. These have numbered—arriving at the St. Lawrence River Quarantine Station—seventy-seven (77), and amongst them there have been found two (2) 'cholera carriers.' It will have been noted that in the last paragraph of the regulation just cited, the period of detention under quarantine observation for cholera contacts has been fixed at ten days, unless after five days detention they are found not to be cholera-bacillus carriers. This clause in the regulation was inserted to diminish the danger from cholera bacillus carriers. These regulations are still in force, and will continue to be carried out at the passenger ports of arrival, Quebec, Halifax and St. John, until there is such subsidence of the disease in Europe as justifies its suspension. Should the present epidemic of cholera in Europe continue and extend, it may be necessary to take into consideration the expediency of providing for the disinfection at the ports of entry of luggage packed in the infected districts, and brought out unopened in the holds of vessels, to obviate the danger of such luggage being first opened inland, and clothing soiled with cholera discharges washed, and the contaminated water possibly getting into water supplies, as well as infecting persons engaged in the actual washing. This precaution was taken at the ports of entry during the cholera epidemic of 1892–96.

REMARKS ON THE WASHINGTON SANITARY CONVENTION OF 1905

WITH SPECIAL REFERENCE TO YELLOW FEVER AND CHOLERA

DR. JUAN GUITERAS
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Read before the American Public Health Association, December, 1911, Havana, Cuba

I propose in these remarks to study some changes that I think should be made in the Washington Convention of 1905. It should be remembered that the Conference of the American Republics held on that date agreed to accept the Paris Convention of 1903, adding all that was pertinent to the management of yellow fever, thus filling the blank left in the European Convention.

Otherwise the American Convention differs from the European only in that we insisted upon the use of the word "observation" generally in lieu of the word "surveillance." This has subjected our American methods to criticism from some quarters. Even in our own countries when complaint is made of the stringency of quarantine measures, and the detention of passengers for observation, some are apt to bring forth, in contrast, the more liberal practice of some European countries, specially England.

I wish to dwell briefly upon the difference of conditions that has brought about the difference of procedures that we have mentioned. Our American countries enclose extensive territories into which are flowing continuous streams of immigrants. It is next to impossible to keep track of these dispersing multitudes over ranches, mining camps and sparsely peopled communities. Hence the necessity of some detention of suspects and contacts at the point of entry. The nations that, at home, stand for the open door in matters of quarantine are very far from carrying these methods into their colonies. The shores of the Red Sea are dotted over with quarantine stations for the control of the movements of pilgrims who, in many respects resemble our immigrants. Ceylon and Malta also are well provided with detention camps.

The changes I would suggest in the Washington Convention of 1905 are the following:

Article I in its present form reads: "Each Government should immediately notify other Governments of the first appearance in its territory of authentic cases of plague, cholera or yellow fever."

The article does not specify how many these first cases should be, and in the use of the plural it seems to leave a loop-hole to await for several cases to occur before the notification is made. It seems to me that the specification should be made on whether the cases be imported or not, and in the latter event, a single case should make the declaration obligatory.

I would propose that the article read:

> Article I. Each Government should immediately notify other Governments of the first appearance in its territory of *an authentic and autochthonous case of plague, cholera or yellow fever.*

Article VIII in its present form reads: "To limit the measures to the affected regions alone, Governments should only apply them to persons and articles proceeding from the contaminated or infected areas."

The amendment proposed to this article explains itself. I should only remind the reader that yellow fever has more than once broken out in localities from whence it had apparently disappeared, without fresh importation, and after many months of seeming indemnity. The explanation of this phenomenon is contained in the amendment, which is as follows:

> Article VIII. To limit the measures to the affected region alone, Governments should only apply them to persons and articles proceeding from the contaminated or infected area. *Exception may be made in the case of yellow fever in sparsely populated countries with endemic foci, where the presence of a large immune population may conceal the existence of infected mosquitoes.*

The 3rd paragraph of the same Art. VIII now reads:

> "But this restriction, limited to the infected area, should only be accepted upon the formal condition that the Government of the infected country shall take the necessary measures: 1, to prevent, unless previously disinfected, the exportation of articles named in 1 and 2 of Article XII coming from the contaminated area; and 2, measures to prevent the extension of the epidemic; and provided further, that there be no doubt that the sanitary authorities of the infected country have faithfully complied with Article I of this Convention."

This paragraph does not specifically require the Government to make all reasonable efforts to enquire into the possible extension of the disease into other sections of the country.

I would, therefore, propose that the paragraph read as follows:

> But this restriction limited to the infected area, should only be accepted upon the formal condition that the Government of the infected country shall take the necessary measures, 1, *to investigate and report upon new cases that may present themselves in other areas*, 2, to prevent, unless previously disinfected, the exportation of articles named in 1 and 2 of Article XII coming from the contaminated area; and 3, measures to prevent the exten-

sion of the epidemic; and provided further, that there be no doubt that the sanitary authorities of the infected country have faithfully complied with Article I of this Convention.

Article XX now reads:

"Classification of ships. A ship is considered as infected which has plague, cholera, or yellow fever on board, or which has presented one or more cases of plague or cholera within seven days or a case of yellow fever at any time during the voyage.

"A ship is considered as suspected on board of which there have been a case or cases of plague or cholera at the time of departure or during the voyage, but no new case within seven days; also such ships as have lain in such proximity to the infected shore as to render them liable to the access of mosquitoes.

"The ship is considered indemne which, although coming from an infected port, has had neither death nor case of plague, cholera, or yellow fever on board, either before departure, during the voyage, or at the time of arrival, and which, in the case of yellow fever, has not lain in such proximity to the shore as to render it liable, in the opinion of the sanitary authorites, to the access of mosquitoes."

This classification is not correct in the part that refers to yellow fever, and it is not easy to make it so if we wish to preserve the division, sanctioned by usage, into the three categories mentioned. The difficulty is obviated if we exclude altogether those ships that have had no possible contact with any source of contamination; namely, ships coming from clean ports. Therefore I would suggest that the Article be headed: *Classification of ships proceeding from infected ports* which should, after all, be the subject of interest in a sanitary Convention.

If we proceed now to analyze the article we find that the first paragraph is wrong, because a ship can not be called infected if it has a case of yellow fever on board, but no mosquitoes.

The second paragraph is deficient, because it might admit as suspected ship that is more dangerous than the one described in the first paragraph as infected. If the mosquitoes from the infected shore mentioned in the second paragraph are infected mosquitoes, there certainly can not be a ship more infected than that.

The third paragraph is wrong, because it does not take cognizance of the fact that infected passengers might have been embarked at the port of departure, and if the trip has lasted less than six days, they may not have had time to pass the period of incubation. A most dangerous ship to be called indemne.

The writer of these notes is mostly responsible for these errors that he is now criticizing, but the adaptation of the Paris Convention to the problems of yellow fever was done without any preparation and with little time to dispose of; and, furthermore, the measures dictated for the management of these several classes of vessels, sufficiently safeguarded the health interests. As will be seen later on, these measures, practically require no modification.

I would propose, therefore, that the Article read as follows:

Article XX. Classification of ships *proceeding from infected ports.* A ship is considered as infected which has plague or cholera on board, or which has presented one or more cases of plague or cholera within the last seven days. *In the case of yellow fever a ship is considered as infected which has yellow fever on board, or has had one or more cases at any time during the voyage, and which has been exposed to the introduction of mosquitoes on board.*

A ship is considered as suspected on board of which there have been a case or cases of plague or cholera at the time of departure or during the voyage, but no new case within seven days. *In the case of yellow fever, the ship which, having received persons and mosquitoes from the infected shore arrives after a trip of less than six days without yellow fever on board.*

The ship is considered indemne which, although coming from an infected port, has had neither death nor cases of plague or cholera or yellow fever on board, either before the departure, during the voyage, or at the time of arrival, *and which voyage, in the case of yellow fever, has exceeded six days, the ship not having been exposed to the introduction of mosquitoes.*

And now we come to Articles XXVI, XXVII, and XXVIII, dealing with cholera. They are far from being sufficient, and the Governments of the United States, Canada and Cuba, under advice of their respective sanitary departments, have been obliged to modify them essentially in dealing with the present epidemic in Europe.

During the past summer therefore, the passengers coming from infected ports have been detained, not for a specified period of time as is prescribed in the Articles we are criticizing, but according to the principles sustained in the concluding remarks of this paper; that is, the passengers have been detained until they could be proven not to be infective. This proof has necessitated the unpleasant operation of the introduction of a rectal swab.

I think it will be generally admitted that we were justified in doing this. There is, however, a matter of detail which should be very carefully considered. The Public Health and Marine Hospital Service of the United States in promulgating their new and important "Addition to Quarantine Regulations" dated July 19th, have restricted the application of these measures to the steerage passengers. The order reads: "All steerage passengers arriving at ports in the United States from ports or places infected with cholera shall be subjected to bacteriological examination and shall not be admitted to entry until it has been determined by said examination that they are not cholera bacillus carriers." In a recent letter from Surgeon-General Wyman he calls my attention to the fact that the Quarantine Regulations of the United States would be sufficient authority to extend the application of these measures to the first class passengers, whenever it were deemed necessary, and this is, in fact, so; but I am inclined to think that this detention and examination of first class passengers should be specifically mentioned in the main body of the Regulations in force, and, as it will be seen forthwith, I propose to introduce the subject in the amendments to the Washington Convention.

This subject will serve, besides, to introduce formally in the body of the agreement the principle of a distinction in the management of cabin and steerage passengers. This principle was introduced in the Paris Convention by making special provisions for the pilgrims traveling on the Red Sea. We in America should establish the difference with respect to the immigrants who are unquestionably the main channel of introduction of infectious diseases.

The Articles in their proposed amended form would read as follows:

Article XXVI. Ships infected with cholera are to be subjected to the following regulations:

1. Medical visit (Inspection).
2. The sick are to be immediately disembarked and isolated.
3. *If no sickness has occurred among the first class passengers these may be disembarked at once or, at the discretion of the Health Officer, they may be disembarked at the Observation station, to be released as soon as they are proved not to be infected. In either case they may be subjected to surveillance for five days.*
4. *If there has been evidence of infection among the first class passengers, they shall be examined bacteriologically on board and disembarked immediately after, separating the bacillus carriers who shall remain under observation until their infection has disappeared. The remainder shall be kept under observation for five days, and released if no case of cholera develops among them.*
5. *The third class passengers shall be examined on board by the rectal swab as rapidly as possible. The bacillus carriers shall be isolated until their infection shall have disappeared. The rest shall continue under observation until a second swab taken on the seventh day prove the absence of bacillus carriers, when they shall be released.*

The rest of the Article, referring to other matters than the passengers remains unaltered, except that the paragraphs numbered 4, 5 and 6, become 6, 7 and 8.

Article XXVII. Ships suspected of cholera are to be subjected to measures prescribed under Nos. 1, 6, 7 and 8 of Article XXVI.

First class passengers will be subjected to the measures prescribed under No. 3 of Article XXVI. Third class passengers shall be examined on board by the rectal swab, as soon as practicable. If no bacillus carrier be found, and there has been no sickness on board, the said passengers shall be released, provided the duration of the trip has exceeded five days; otherwise they shall be detained until the completion of this period from the date of departure.

Article XXVIII. Ships indemne of cholera are to be admitted to free pratique immediately, whatever may be the nature of their bill of health.

The only regulations which the sanitary authorities of a port may prescribe in their case are the measures provided in Nos. 1, 6 and 8 of Article XXVI.

The crew and passengers may be subjected to a bacteriological examination, and be released immediately on a negative finding.

The remainder of the Article is not changed.

Article XXIX. It refers to the management of ships infected with yellow fever, and remains as it stands.

Article XXX. Ships suspected of yellow fever are to be subjected to the measures which are indicated in Nos. 1, 3 and 5 of the preceding article; and if not fumigated, the cargo shall be discharged as directed under subparagraph (a) or (b) of the same Article. *With respect to No. 3, the observation shall date from the last day of exposure to the infection.*

No amendment is offered to the other Articles, but their numbers are altered by placing those that refer to the yellow fever in their proper place after the consideration of plague and cholera, instead of placing them at the end.

In proposing these changes to our international sanitary code I believe it may not be amiss to discuss in conclusion and in a general way the subject of Quarantines.

We are all agreed in accepting that the Sanitary Conferences commencing with that of Paris in 1851, more or less successfully striving to arrive at some agreement which was finally obtained in the Venice Convention of 1892, worked for the general good. They mitigated the horrors of medieval quarantines, and in subsequent Conventions they continued the movement of reform, until even the name of the the thing was suppressed. Surveillance, observation, detention, isolation were euphemisms that came into general use. As a matter of fact they did represent actual progress in the direction of a more reasonable application of the principles upon which the system of quarantines was founded.

But did they change in any way these principles? Were the principles themselves suffering any change through the increasing acquisitions of science? On the contrary, every step in advance, up to the present date, reaffirmed the principles upon which quarantines were based. Epidemiologic investigations, the new science of bacteriology, the development of the doctrine of infection, the recognition of the mild forms of infection, and of the possible prolongation of the infective state, were all pointing clearly to the individual as the main source of danger, and were establishing on most solid foundation the conclusion that the sick individual should be restrained, treated or controled in some way until he ceased to be a menace.

This was the principle of the old quarantines: to hold the individual until he was not more dangerous; but our ancestors had no scientific means of determining the point in question, and in a hit-or-miss way they prolonged the detention for days (forty days which constituted the reglamentary quarantine) and for weeks and months. This actually militated against the object in view, and could not help but bring the system into discredit.

But if today we can determine very generally when an individual is dangerous, and when he ceases to be so, why should we not detain him when he comes from abroad, caring for him at the same time, and giving him a good chance for recovery, until he ceases to be a menace? Why not do this, and call it quarantine? And why should we not clearly state that this should be our main object: the prevention of the propagation of disease.

I read in an important book on Prophylaxis* that "the object of international prophylaxis is twofold: to prevent the propagation of contagious diseases, and to suppress all needless restraints to commerce through measures that are void of efficiency."

In the discharge of our duty as sanitarians we should be willing to go as far as any one in protecting commerce and the industries against all unnecessary hindrance, but we should not be willing to say that that is one of the objects of sanitary science. It is much as if we said in a definition of Medicine, that the object of that science is to manage disease with as little expense to the patient as possible; or as if a military writer said that the object of war is to fight successfully and do as little damage as possible. Let us consider the latter aspect of these problems as a most important element in ways and means; but let the prevention of disease be our only object.

I venture to say that the time has come when we should squarely put the question as to how, on their part, commerce and the industries have corresponded to our efforts to safeguard their interests. I am not aware, that any writer on economic questions has ever given a definition of business that might be considered in keeping with the one above quoted in reference to international prophylaxis; no such writer has ever said, for instance, that the object of business is twofold: to make money and to see that the interests of sanitary science be not needlessly trammeled.

In my rather long experience with serious epidemics I have never once failed to find important business interests enlisted against us during the first stages of the epidemic manifestation. It would not be difficult to prove that most of these outbreaks have gained strength because of the insistent demand on the part of business not to be disturbed by the frank declaration of the truth. The result has been that the first steps in prevention have been taken with fear of making too much noise. The work has been done in the dark, as it were, and in that manner, it could not be well done. On certain occasions this procedure is most inhuman. An infected city, for instance, holding some popular celebration, will conceal its condition and open its gates to the influx of strangers, who have returned to their homes carrying the disease with them, and spreading it wide over the country. There are recent examples in Europe and we have done the same thing in America.

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*Prophylaxie Internationale et Nationale, par le Dr. Paul Faivre (Paris, 1908).

The frank confession of the truth, the open handling of first cases and of suspects saved Florida from an extensive conflagration in 1905; saved Cuba, at the same time, from the repetition of the horrors of a wide-spread epidemic, such as she was familiar with in colonial days; saved Mexico from becoming an endemic focus of plague, has saved New York quite recently and is protecting Germany at the present time. The truth in these matters I hold, should have the precedence before science.

In some of these epidemic diseases, in which we have not found as yet some laboratory method for diagnosis, great reliance is placed on the opinions of certain men. I know not how often I have found the young man, entirely unacquainted with the disease through former experience, to be in the right, and the old veteran to be in the wrong. I do not hesitate to say that a long standing reputation in this field is more due to a fearless regard for the truth than to scientific attainments.

And if we are not going to have the truth, what is the use of holding international conferences? All sanitary conventions are based on the good faith of the contracting parties. Are they standing up to their obligations? Our recent experience with the cholera epidemics proves that they are not, and I hope that this has been taken into consideration by the Sanitary Conferences that are being held at this moment in Paris and in Santiago de Chile.

It has occurred to me that we might with advantage employ in international sanitary practice some of the methods accepted in diplomatic international relations. It is well known that on the eve of important international developments the representatives of the Powers have called upon the Government principally involved in the political question, and have asked in a formal manner as to the purposes of said Government, and have even tendered some frank advice, sometimes with the object in view of preventing unnecessary strife and loss of life. Such conferences have not been rare in connection with the Balkan problems and those in which the nationalization of Italy was concerned. Quite recently the representatives of the Great Powers convened in Washington during the negotiations that culminated in the Spanish-American war, to express through the Secretary of State an appeal to the moderation and humanity of the American people in the negotiations with Spain.

War and bloodshed were at stake in these conferences. But now I ask you to muster all the human lives that were lost in these conflicts. Pile the dead that fell on the Black Sea shore of Crimea, on the fertile fields of Northern Italy, and under the Tropical Sun of Cuba and the Philippines: what are they, compared with the hosts that have dropped in the wake of an invasion of cholera? Now if a Government be conspiring to inflict this evil upon neighboring and distant nations; if a Government be bent on concealing the existence of cholera in populous and commercial sea-ports from which throngs of emigrants are moving across the seas, that nation should be called upon to meet squarely the responsibility of her acts, and a conference of the representatives of the powers accredited in her capital, should demand a truthful statement of the facts, in the name of humanity.

MEASURES ADOPTED BY THE UNITED STATES GOVERNMENT TO PREVENT THE INTRODUCTION OF CHOLERA

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Read before the American Public Health Association, December, 1911. Havana, Cuba

Since 1893 the United States has not been seriously threatened with the possibility of cholera until the fall of 1910. At that time cholera, which had been prevailing in southern and western Russia for two or three years, made its appearance in Italy. It did not appear in Italy until late in the summer and fall of 1910, and with the onset of cold weather the epidemic decreased markedly in that kingdom. In the spring of 1911, however, the infected area in Italy became wider and the number of cases greatly increased, so that it became necessary for the Federal Government, through its Public Health Service, to adopt unusual measures in order to prevent the entrance of cholera into the United States during the past summer.

The measures instituted to prevent the introduction of cholera into the United States may be considered under three general heads:

1. Quarantine measures enforced at the foreign ports of embarkation.

2. Quarantine measures enforced during the voyage; and these may be divided into (a) those provided for in the United States quarantine regulations and (b) those enforced by the Royal Italian Commissioners.

3. Quarantine measures enforced on arrival of vessels at the various quarantine stations in the United States; and these may be subdivided into (a) special inspections for the detection of cholera by quarantine officers (b) the immigrant destination notification system, and (c) expert aid in the diagnosis of cholera.

Officers of the Public Health and Marine-Hospital Service were detailed, under authority of the quarantine laws, for duty in the enforcement of these measures at Genoa, Naples, Palermo, Messina, and Catania, Italy; Marseilles, Triest, and Libau.

The measures enforced at foreign ports, made in accordance with the United States quarantine regulations, consisted of the enforcement of a detention of five days of steerage passengers from cholera-infected ports and the observation of those detained during that time. The disinfection of baggage was required and the prohibition of any food stuffs being brought in the baggage of steerage passengers. In addition, steerage passengers from cholera-infected districts but embarking at clean or non-infected ports were required to produce satisfactory evidence as to their place of residence during the five days immediately preceding embarkation. Crews of vessels were not allowed ashore in infected ports. In addition to this, every immigrant before embarkation was subject to a strict medical inspection. The Italian Government, in addition to the measures required by the United States quarantine regulations, put into effect, for the time, the examination of detained immigrants to detect possible bacillus-carriers, and by this means alone 41 carriers were prevented from sailing from Italian ports.

Under the second general heading were the special requirements of the United States quarantine regulations in regard to ships from infected localities, which included among other things the isolation of all sick persons and the complete disinfection of their clothing, bedding and discharges. A complete clinical record was required to be kept by the ship's surgeon of all cases of sickness aboard and the record delivered to the quarantine officer at the port of arrival. The Italian law requires that on every Italian vessel carrying Italian immigrants there shall be a Royal Commissioner, who is an officer of the medical corps of the Italian navy. This officer, in addition to seeing that the Italian immigration regulations are carried out, is charged with certain sanitary duties which he exercises on vessels outward bound from Italy as well as on the return voyage. Their sanitary duties consist of reports to the Royal Commissioner of Immigration of every case of infectious disease occurring among immigrants or any case presenting the suspicion of an infectious disease. During the past year they had special orders issued to them which gave them exclusive control as to the hygienic and disciplinary measures to be enforced aboard vessels for the early detection of cholera. They were required to keep material from all cases of diarrhoea occurring on board and also from any deaths occurring at sea, and provision was made for the sending of wireless messages to the Italian consulate at the port of destination, so that the presence of cholera aboard a vessel would be known before its arrival. They were provided with a small working laboratory for the diagnosis of the disease.

In accordance with an arrangement with the Department of State these commissioners rendered reports to the quarantine officers at the port of arrival in the United States as to the condition of health and all details of any sickness occurring on their vessels. The great value of this work was well shown in the Duca degli Abbruzzi, from which vessel cases of cholera were removed at the New York quarantine. The Royal Commissioner on this vessel, by preserving material from a child who had died at sea with suspected symptoms, enabled the quarantine officer to make a diagnosis of cholera; the bacteriological diagnosis was confirmed in the Hygienic Laboratory in Washington.

It may be stated that the aid rendered the quarantine service by the

Royal Commissioners has been of a very high order and their services have been greatly appreciated.

Under the third general heading are the measures adopted on arrival at the quarantine stations in the United States. In addition to the quarantine regulations previously enforced these requirements were added to by certain amendments to the quarantine regulations. On July 6th an amendment to the quarantine regulations was promulgated which, among other things, contained the following:

To diminish the danger from cholera bacillus-carriers, passengers coming from ports or places where cholera prevails and arriving on vessels upon which cholera has been reported, shall be detained ten days for observation, unless after five days detention they are found not to be bacillus-carriers. The same provision shall also apply to other persons arriving on said vessels who, for special reasons, are deemed liable to be thus infected.

Attention in the same circular was also invited to the special regulations on account of cholera which prevented the bringing in or the shipment of certain food products, such as unsalted meats, sausages, fresh butter, cheese, fruit, etc., and any food in the possession of passengers arriving in the United States was ordered to be destroyed.

While it was believed that the above referred to amendment to the regulations considerably added to the safeguards previously enforced to prevent the entrance of cholera into the United States, the great increase of the disease in Italy and its spread to other Mediterranean ports resulted in the promulgation on July 19 of another amendment to the quarantine regulations in which the following occurs:

All steerage passengers arriving at ports in the United States from ports or places infected with cholera shall be subjected to bacteriological examination and shall not be admitted to entry until it has been determined by said examination that they are not cholera bacillus-carriers.

This amendment to the regulations, which had been under discussion for some time, was put into effect from the date of its promulgation at the ports of New York, Boston and Providence, which ports were the only ones having direct Italian immigration.

Under authority of the quarantine laws of the United States Passed Assistant Surgeon R. H. von Ezdorf was detailed as inspector of the local quarantine at New York and Passed Assistant Surgeon Allan J. McLaughlin under a similar detail at the local quarantines at Boston and Providence. In addition, two officers from the Hygienic Laboratory especially trained in the bacteriological diagnosis of cholera were sent to the New York quarantine to supervise and assist the local quarantine authorities in the large number of bacteriological examinations made necessary by the amendment to the regulations.

Specimens were obtained from all steerage passengers, and in certain instances from the crew, and subjected to bacteriological diagnosis in order to determine whether the discharges came from cholera-carriers or from persons in the early stages of the disease.

From July 1 to November 1, 1911, there arrived at the ports of New York, Boston, Philadelphia, Providence and Baltimore over 237,000 passengers, all of whom were subjected to a strict medical examination and in spite of this large number of passengers arriving at ports in the United States, of whom about 25,000 came directly from cholera-infected countries, no outbreaks of cholera have appeared in the United States.

In the search for cholera-carriers over 23,000 bacteriological examinations were made, with the result that at the New York quarantine the cholera vibrio was isolated from 28 persons with the disease and 27 healthy persons were found to be discharging the causative agent of cholera in their fæces; these latter could not have been detected except by the laboratory examination required by the amendment to the Federal quarantine regulations promulgated under date of July 19, 1911. It can be stated, I believe, without fear of contradiction that the adoption of this measure alone by the Federal Health Service has saved the people of the United States from the horrors and expense of a large epidemic of cholera.

In addition to the measures just referred to, the immigrant-destination notification system was continued. In accordance with this system, where immigrants arrive from cholera-infected places, the health officers at their places of destination are sent the notification cards, informing them that immigrants from such and such places arriving on such and such a ship are en route to their cities, so that they may have oversight during the incubation period, at least, of cholera. While it was realized that in some cases these cards soon found the waste basket, it must be admitted that such an event was not due to the system but to faults beyond the authority of the Federal Government at the place of destination.

The third measure was expert aid in the diagnosis of cholera. The Service has available a number of officers who have not only had clinical experience with cholera, but have had a large experience in its laboratory diagnosis. There have been reported to the Surgeon-General of the Public Health and Marine-Hospital Service a number of suspected cases of cholera from various portions of the United States, and in such instances the case was investigated by an expert from the laboratory.

As a result of the enforcement of these measures, which have been but briefly referred to, there have occurred only five cases of cholera other than those at quarantine or on vessels in quarantine in the United States and in no instance has there been a spread of the disease from any of these cases; thus again demonstrating the efficiency of quarantine methods against cholera based upon the result of laboratory investigations.

The enforcement of these measures, which at first sight may have seemed severe and burdensome, has been carried out with a minimum of interruption to immigration or interference with commerce. This is the first time in the history of quarantine in this country, or in any other country on so large a scale, that a quarantine has been enforced based upon the principle that if a person liable to convey infection has been shown by laboratory examination to be free from such possibility, there should be no hindrance to his entrance into the country.

As cholera is still present in certain parts of Europe we are not, to use a homely expression, "out of the woods;" but the prevention by the Federal Health Authorities of the introduction of cholera into this country during the summer of 1911 is an achievement in public health work not surpassed since we learned how yellow fever may be prevented.

THE DEFENSE OF THE MEXICAN REPUBLIC AGAINST THE POSSIBLE INVASION OF CHOLERA

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Mexico City, Mexico

Read before the American Public Health Association, Havana Cuba, December, 1911

In order to demonstrate to the public authorities that the measures proposed to safeguard the Mexican Republic against the possible invasion of cholera, were based on exact scientific data the Mexican Board of Health issued two pamphlets in which was stated the general well recognized facts concerning the disease and the manner in which it is spread.

I will not weary you with reading these pamphlets. One was intended to give every individual, every family or small group, a knowledge of the germ of the disease, of the way in which it can enter the system, of the way in which it issued from the same, and inculcate the fundamental idea that the excreta is what contains that germ, and that the most certain way to prevent any attack by the disease, is to disinfect with the greatest care, the vomit and dejecta of the patient; to avoid carrying to the mouth any article that can in any way have been contaminated by that germ, and to warn everybody against the danger of introducing the germ of the disease into the system by means of contaminated water. The other pamphlet is called "Recommendations to the Municipal Councils of the Republic, and specially to those of the Cities on the United States frontier, or of the ports on the Gulf of Mexico," and is intended to instruct those communities on the measures which they ought to take to protect themselves from cholera.

The same knowledge of bacteriology has served as a basis for the instructions given to the Delegates and communicated to the State Governments, the Political Chiefs, and the Mayors of Municipalities.

The instructions issued by the Board form three principal groups as follows:

I. Those which are intended to prevent the disease reaching us from the points in which it now exists;

II. So that if those measures are not sufficiently efficacious, each community may have the resources necessary to defend itself from an epidemic, and

III. So that these resources may also be within the reach of small groups, even the family and the individual, in order that they may all be able to defend themselves from disease.

This is the order in which I propose to explain the measures which have been adopted.

The measures which are intended to protect the nation as a whole, are those which pertain to the International Sanitary Police and of these the following have been adopted:

As it is impossible to establish either Sanitary Stations or Lazarettes, equipped with the buildings and a sufficient staff to make a defense against cholera in all the ports of the Republic, by special Decree of the Executive, the Ports of Tampico, Veracruz and Progreso on the Gulf Coast, have been selected to receive passengers and cargo from the foreign countries which have been invaded by cholera, and the Port of Coatzacoalcos, to receive only the cargo, in order not to disturb the interoceanic traffic over the isthmus of Tehuantepec. On the Pacific Coast, the Port of Salina Cruz is the one best equipped to receive passengers and cargo from the Orient, where cholera prevails almost continuously. That port not only has a sanitary station and lazarette for the first and second class passengers, but also sheds with a capacity of 700 immigrants, where they can be kept under observation before allowing them to pass into the interior of the country. The introduction of immigrants exceeding ten in number is prohibited in the other Pacific ports, because up to that number, it is possible to submit them to the rules of the Sanitary Code.

As I have stated, the ports which are open to receive vessels from countries which are invaded by cholera, possess a sanitary station and lazarette with departments for the reception of the suspects, the confirmed cases and the convalescents. They are furnished with an equipment for the destruction of the dejecta before they are thrown into the sea, and are also provided with screened doors and windows, which will not allow the entrance of flies or mosquitoes into those places where sick or suspected persons are kept.

In order to give confidence to the employees who have to board the vessels arriving from infected parts, orders have been given for the propagation of anti-cholera vaccine amongst the sanitary agents, as well as those employed by the treasury, the longshoremen, consular agents and all other persons whose duties carry them on board the ships when they reach Mexican ports. As we do not have absolute confidence in these vaccines, orders have also been given, that all persons even though vaccinated, shall make no use of the water carried on board the ships, and they have been recommended to take all the precautions referred to in the "instructions."

In order to facilitate the rapid diagnosis of doubtful cases by the delegates in the ports, they have been furnished all the different resources taught by bacteriological science, for making a rapid discovery of the cholera germs. In those ports in which the staff is not sufficiently trained, they have been provided with sterilized vessels in which the excreta are deposited for purposes of examination. Those from the Port of Progreso are examined in Merida, and those from Veracruz in the Bacteriological Laboratory of the Supreme Board of Health, and wooden vessels have been sent to them, which will permit the transportation of those matters without danger to the carriers or of the spread of the disease.

Instructions have been given to the delegates, besides those which are set forth in the Sanitary Code and Maritime Sanitary Regulations. These instructions have been worded in such a way as to utilize the present knowledge of science, and so discover the bacillus carriers by making an analysis of their excreta, and not to suspend their treatment as suspects of carrying such germs, until the bacteriological examinations, repeated during five consecutive days have demonstrated that they are no longer dangerous. As will be understood, the instructions vary according to the port which is open to traffic, as well as for Coatzacoalcos which can only receive cargo, and for the other coast ports which can receive neither passengers nor cargo.

In the frontier towns, provisional lazarettes have been established, and the sanitary inspectors of those localities, have also received instructions which amplify and complete those already contained in the Sanitary Code.

If, in spite of all these precautions, cholera should invade either the ports or frontier cities, the authorities of those places have a series of "Recommendations," which are intended to give general rules for each locality, whatever may be its condition and whatever may be the sanitary services already established, and these recommendations give all the information possible for preventing the propagation of the disease.

These recommendations have also been forwarded to the other Municipalities of the Republic, through the State Governments, in order that they may reprint them and distribute them throughout each State.

In order to furnish means of defense against cholera and place such means within the reach of social organizations, families and individuals, a large edition has been printed of the "Instructions for the defense against cholera, by each individual or family," and these have also been distributed through the State Governments with a request that they should order them reprinted if found suitable.

Both the "Recommendations" as well as the "Instructions," are based on our modern knowledge of cholera dissemination in order that everyone should know that these recommendations are made and based on scientific data.

In the defense which is being organized in the Capital of the Republic, an attempt is made to get all classes of society to contribute their efforts in preventing the arrival of the disease, and if in spite of all precautions it should appear, to contribute to prevent its propagation.

The Executive has been consulted as to the advisability of securing the rapid extinction of the epidemic of typhus, both because it will be more easy to fight a single epidemic, as well as because, all the measures which may be adopted for the suppression of typhus, will redound to the advantages of those which may be taken for the defense against cholera.

As is natural, the Board which is directly charged with the care of the public health, has found it necessary to increase its staff, and has done so by increasing the number of Sanitary Inspecting Physicians who make domiciliary visits, not only for the purpose of discovering the sick, but also to report on the sanitary installations in the different places which serve as a more or less permanent dwelling to a great number of individuals.

A special service has been organized of non-medical inspectors, whose duty it will be to execute the orders which may be issued by the Sanitary Authorities.

Special instructions have been issued for the use of the medical and non-medical inspectors, the food and drink inspectors, the veterinarians who are charged with the supervision of the slaughter houses, butcher shops and dairies, and all other branches of Sanitary Police.

An increase has also been made in the Staff of the Sanitary Engineers, who are consulted by the Medical Inspectors. An increase has likewise been made in the Staff of the Disinfecting Department, which not only will disinfect the places in which sick people or suspected people are found, but also whitewash the dwelling of the poor after the disinfection is made, and provide the persons who attend sick individuals, with new and disinfected clothing in place of that which was worn during their attendance on the patient.

Those persons, after being bathed and disinfected, are taken to houses of detention which have been provisionally established in the four cardinal points of the city, so as to lodge them whilst their dwellings are being disinfected and whitewashed.

In order to avoid crowding, only the persons who can live there with the sufficient quantity of air, are allowed to return to the dwellings originally occupied by the sick, after the rooms have been disinfected and whitewashed, and the rest of them are left, in the houses of detention, under the charge of the Charity Boards which already exist in the city.

As the public services in this city are under the charge of the Public Works Office, that Department has assumed the care of the springs of drinking water, so as to prevent, under the provisions of Art. 338 of the Sanitary Code, the contamination of those springs or of the water cisterns, by the dejecta which may contain the cholera germ. The same office is charged with the supervision of the water supply system, the sewer system of the city, which is constantly kept clean by flushing with water that is pumped in from the pumps at the head of the Calzada de la Piedad.

It is also charged with street sweeping, incineration of the garbage, supervision of the cemeteries and in combination with the Board of Health it takes the necessary precautions in the transportation of dead bodies; it specifies the cemeteries and points therein, where such bodies are to be buried, and orders the destruction of these bodies by cremation whenever possible.

As the plant to bring pure water from Xochimilco is not as yet completed, the Public Works Office is taking water to the districts which have none, and a study is being made of the way to supply the water after boiling. As the sewer system is not yet complete, steps are being taken to give the best possible service for the removal of the excrementitious matters, in those parts of the city which are not reached by the sewers.

With the resources at its disposal, the District Government will undertake to enforce compliance with the provisions above mentioned, by means of the police.

The Department of the Interior has been requested to address the War Department through the channel of the Special Office existing in that Department and the instruction hospital, to charge itself directly with the cleaning of the barracks and other places where the garrison has to render service, as well as the destruction of the cholera germs in the excrementitious matters that proceed from those localities, and also to give the soldiers instruction in the precepts of individual hygiene, so that each one may understand how to defend himself against the epidemic.

Through the same channel of the Department of the Interior, a request has been addressed to that of Public Education, to make efforts to avoid the propagation of cholera in all the educational establishments which are subordinate to this Department, by means of its school hygienic service. A request has also been made for the assistance of the institutions which depend on that Department, such as the National Medical Institute, the Bacteriological Institute and the Anatomo-Pathological Institute, in order that these important institutions may afford the assistance within their power; the Bacteriological Institute furnishing, as it has hitherto done, the anticholera vaccine, the material necessary for the rapid discovery of the cholera germ in the dejecta, and in the event of the disease making its appearance in the city, by making the bacteriological diagnosis in the excreta which may be forwarded by the physicians near that institute. The Anatomo-Pathological Institute will also contribute by associating itself with the physicians of the hospitals, in the study of the dead bodies of cholera patients, and lastly, the National Medical Institute will assist by discovering the cholera germ in the excreta which may be forwarded by the physicians who attend patients in places near the Institute.

The same Department of the Interior has been requested to reserve a sufficient number of wards in the General Hospital, in which to attend patients who suffer from confirmed cases of cholera, and another to be occupied by convalescents. As regards suspects, there is a service already organized for that purpose which will be extended if found necessary.

The same wards have been applied for in the Juarez Hospital, as well as the erection of special sheds if the requirements of the service should make them indispensable. Furthermore, a request has been made that each hospital be equipped, with bacteriological service, if it does not already exist, which will be devoted to making a prompt diagnosis of patients who are suspected of suffering from cholera.

As the Board of Health has a right to promote the organization of Charity Boards in cases of epidemic, it has been thought best to come to an understanding with those already existing, so as to obtain their valuable assistance in the relief of the unfortunate.

A Special Committee of the Board of Health is now deliberating on the request which will be addressed to the Medical Profession, on the necessity of their giving the Board notice of the patients they attend, whether suspected or confirmed cholera cases, and within the shortest possible time. As soon as the Department agrees to lend the services of the Institutes above mentioned, in making a prompt diagnosis of the disease, these physicians will be notified of the place where they can apply for such bacteriological examinations.

Another Committee is studying the way and means to come to an understanding with the wholesale and retail druggists, so as to know what services they will be able to render for the rapid supply of medicines, so that the patients may be attended without loss of time.

As the city contains many industrial or mercantile establishments which employ a great number of persons, most of those establishments have been requested to state, the manner in which they can contribute to the assistance of the sick amongst their own staffs or of their families who may suffer privations through the sickness of the persons who maintain them. Similar enquiries have been sent to the Railroad companies, both national and foreign, and a greater part have already reported to the Board on the resources at their disposal and have generously offered to co-operate with the Sanitary Authorities, in the struggle against the spread of the disease, and in the attendance of the persons attacked. If we have the good fortune of not seeing the cholera reach the capital city, the work undertaken for the assistance of the Sanitary Authorities will not be in vain, as the publication of the doctrine of the disease and of the measures which must be taken for defense against it, is always useful. But if unfortunately we should find ourselves invaded by that terrible epidemic, having our preparations made for defense with due anticipation, and before the multitude is carried away by fright, that defense will be better organized.

INSPECTION OF FEBRILE PATIENTS NON-IMMUNES TO YELLOW FEVER AND INSPECTION SERVICE OF PASSENGERS FROM THE MEDITERRANEAN PORTS

Dr. Antonio Cueto

Special Medical Inspector of Non-Immunes. Secretary of the Commission of Infectious Diseases. In charge of the Inspection Service of Passengers Arriving from Mediterranean Ports

Read before the American Public Health Association, December, 1911. Havana, Cuba

The purpose of my paper is to make known to those who are honoring us with their presence; and those who may not be acquainted with the systems employed by our Sanitary Department, the manner in which our Yellow Fever Service works in the inspection of non-immune febrile patients, and the studies which we have been making in connection with the house-to-house inspection of passengers arriving from Mediterranean ports, where cholera has made its appearance.

The Department of Health and Charities, to which I have the honor to belong, is proud to be able to say that it exercises a real control over yellow fever, but with regard to cholera, fortunately our services have not as yet been put to a test. I can assure you, however, that the lives of all here are perfectly safeguarded, and that when you depart satisfied of having faithfully complied with the sacred duty that brought you here, you will enjoy perfect health.

No one could have dared to make this prediction ten years ago!

And that satisfaction which we feel, necessarily must be felt among you, because it is also your work. Side by side with the name of our immortal Finlay we shall engrave with characters of gold the names of others, whom I shall not mention, fearful as I am of hurting their modesty; who are among my hearers and because their names are too well fixed in the minds of all; men to whose genius Cuba owes so much. Not only my beloved country, for it is Humanity that has been their beneficiary.

Inspection of Febrile Patients Non-Immune to Yellow Fever.

Articles 284 and 286 of the Sanitary ordinances provide that in all Hospitals, Private Hospitals etc. there shall exist one or more wards equipped with double screened doors and windows for the purpose of preventing the entrance of mosquitoes, and which shall be used for non-immune febrile patients as may apply for assistance at those establishments. These are known as Observation Departments or Wards.

Although it is true that the above mentioned regulations provide only that non-immune febrile patients be placed in these wards; it is likewise true, that the Directors of these establishments, in order to co-operate in our work, make it a rule to admit to them, those who although not presenting a feverish condition at the time they are examined, show symptoms of icterus, albumin or frequent vomit, etc., or those who should be kept isolated until a true diagnosis can be established. In that manner we prevent patients affected with yellow fever of the benign or atypical form to remain unprotected during the period of incubation.

These patients are visited every day by a Special Medical Inspector who makes a close examination of each case, has an analysis made of the urine in search for albumin or the diazo-reaction and who may even order that the Laboratory of the establishment shall proceed to take blood samples to establish the diagnosis of typhoid or malaria, etc.

As soon as the differential diagnosis to yellow fever is established, the Medical inspector authorizes the "Pass," notes the diagnosis on the temperature chart, which he should have previously dated and signed.

If for some reason or other the differential diagnosis should not be established and the patient should for any reason be suspected, he then refers the matter to the consideration of the Commission of Infectious Diseases, for which purpose he fills out a blank stating the particulars, name of the patient and antecedents. The Commission which is composed of five members, is then charged with reporting whether or not the case is one of yellow fever.

From the moment the Commission or the Medical Inspector reports the case as negative of yellow fever, the "Pass" of the patient is authorized and he is taken to another ward.

In the same manner and in accordance with the provisions of Article 484 of the Ordinances, all practicing physicians are duty bound to report to the Local Health Officer the existence of febrile cases in non-immune patients who may come under their care at their homes.

Immediately after the receipt of such a report such patients are at once visited by the Medical Inspector.

If any of these cases should happen to be suspected of being yellow fever, the patient is ordered transferred to the "Las Animas" Hospital, with the proper precautions, in one of the service ambulances.

On the other hand if the patient should not present any symptoms of yellow fever, the Local Health Officer, on receipt of the report from the attending physicians in which the diagnosis is made of the case, forwards it to the corresponding Bureau so that steps may be properly taken, or to order the record on file if the case is not one of reportable disease.

In order that you may form an idea of what this system of inspection represents, I have taken the record of the patients sent for inspection at the Observation Wards of the Hospitals and Private Hospitals and from the 1st of January, 1909, date on which was inaugurated the Department of Health and Charities up to the 30th of last month. This record shows that 11,281 patients were examined and gives a total of 33,918 visits on the part of the Medical Inspectors. This does not include the cases of patients treated at their homes by practicing physicians, which number I am not able to give owing to lack of time in obtaining the records.

It frequently happens that we have to examine a patient who on account of the advanced state of the malady, or through the fact that he is in a comatose condition and we are therefore unable to obtain the necessary antecedents in the case. In suspicious cases of this kind, an autopsy is ordered shortly after death occurs. This autopsy is performed by the Commission of Infectious Diseases in order to establish a definite diagnosis.

When this autopsy is performed the material sufficient to proceed with the histological examination is taken and studies and investigations are made under the most modern methods.

In the same manner, all certificates of death issued by physicians, must be "viséd" by the Local Health Officer before they are transmitted or accepted by the Municipal Judges. In this way the suspension of any burial can easily be ordered in time in the cases of non-immunes or of persons where the attending physician is in doubt so that the case may be examined by the Commission and an autopsy ordered if necessary.

In order that we may know at a given moment the stopping place in the city of persons arriving from zones where yellow fever has broken out, and in that way protect Havana from all possible infection, we have organized a service which shows the arrival and departure of all persons at the Hotels, Inns, Boarding Houses, tenements, etc., whereby the owner or manager of these establishments furnishes us with a detailed statement of the guests who arrive and depart from his place every day, and on which report is specifically stated, the place last visited and the place where they go next to reside.

In the same manner we have records of the domicile of passengers arriving at our harbor proceeding from other ports in the island on information which is furnished us by the Quarantine Office.

This service has been put to work in all the local health offices throughout the Republic immediately after a case of yellow fever has been reported at any place within the island.

The blanks which are used for this service by the owners of the establishments on which is reported to us the daily movement of guests, as well as the envelopes with postal frank to contain them, are furnished free by the Department of Health, so the compliance with this disposition is in no way burdensome.

The following is a fac-simile of one of the blanks used:

REPUBLIC OF CUBA

DEPARTMENT OF HEALTH AND CHARITIES

DIRECTORSHIP OF SANITATION

Special Report

Class of the establishment..............................name..............................
....................................located at...

..............19......

Director of Health:

....

Sir:

In compliance with orders, I have the honor to inform you, that during the day yesterday, there have arrived and departed from this establishment the following persons:

ARRIVALS

NAME	AGE	NATIONALITY	PLACE WHERE LAST RESIDED

DEPARTURES

NAME	AGE	NATIONALITY	ARRIVED ON		PLACE OF NEXT RESIDENCE
			Day	Month	

Yours very truly,

....

....

House-to-House Inspection of Passengers Arriving from Mediterranean Ports.

Ever since cholera made its invasion in epidemic form in Italy, the Department of Health, without loss of time, began to adopt all the necessary precautions in the matter based on the knowledge we had concerning the manner this disease is propagated and not forgetting the important part which is played by "Bacillus carriers." In order to face so serious a problem and in case we should be visited by this fatal disease we had to be prepared, and for that reason in the month of September, 1910, the Hon. Secretary of Health, on the recommendation of our Director of Sanitation, sent a delegate to Europe. He was instructed to study at Hamburg and Naples the laboratory work done in those cities, as well as to observe the system employed by the United States Marine Hospital Service to inspect and examine the immigrants proceeding from infected districts to ports in the United States.

Upon the return of the delegate, Dr. Cartaya, who was the physician designated, rendered his several reports, all of which have been published in the Official Bulletin of the Department of Health and Charities.

During the month of June when the disease was reported as having in invaded the Quarantine Office in New York city, Dr. Juan Guiteras was named by our Secretary of Health to proceed to that port to make a study, not only of the way the quarantine medical officers handled the large contingent of immigrants arriving there, but to make observations as well, of all patients attacked, paying special attention to the system employed to gather, examine and treat the excreta, and to make complete observations of every case. These studies and observations made at that time were recently published in the Official Bulletin.

While this was being done, we started to prepare our lazarets; the inspection of passengers arriving from Europe was carried on with the greatest precautions, and we began to thoroughly organize ourselves in order to be able to continue our observation of arrivals after they reached their destination without causing these persons the bother natural to detention.

We have employed several methods to obtain our object, and up to the present, we must confess that none of these methods have given us the results which we had hoped to obtain.

The one method which we are at present employing, is that of requesting the passenger who arrives at our ports, to give the place where he intends to reside; and this system which would appear to be satisfactory in reality is not. We find that there is trickery and bad faith, not only among the steerage passengers, but on the part of those who travel in the saloon deck, because many of these on leaving the steamer begin again to use their real names, which they had dropped in order to be able to escape military service in their native country.

Some of these individuals have been tracked all through the island and subjected to inspection on the part of the local health officers, and others have been found at the hotels and inns of the city of Havana. This we were able to do by consulting the lists of arrivals at these establishments, corresponding to the day of their landing in port.

The house-to-house service of inspection is carried out by medical inspectors, whose number is increased or diminished in relation to the amount of work to be performed.

We are at present preparing cards which are to be distributed among passengers arriving at our ports and whom we need to keep under surveillance after reaching land. These cards are written in three languages, and call their attention to the need of knowing their exact location, in order that they may be visited by the Medical Inspector, as well as the responsibility which they will incur if they fail to obey the orders.

At the same time we hand these immigrants another card which they can use to notify us of their place of residence in case they should happen to move from their first place, and in that way they are freed from the responsibility.

I will not take up any more of your time by extending the description of this work. I believe I have sufficiently explained the system we employ in the inspection of non-immune febrile patients. With regard to the inspection of passengers arriving from Mediterranean ports, you have just listened to Dr. Guiteras, who with the ability that is characteristic of him and the authority of his special knowledge of the subject, and who although he has given you but an extract of a report, it has been sufficiently extensive to allow you to appreciate that his is a complete work which would make mine poor in comparison.

But before I conclude, however, permit me to ask of the members of this association this question. Which is the best method of keeping track of a passenger without detaining him, so that he may be kept under proper surveillance during the necessary period?

AN ATYPICAL, ANAËROBIC GAS BACILLUS ISOLATED FROM VACCINE*

DR. WM. ROYAL STOKES and DR. HARRY W. STONER,
Baltimore, Md.

Read before the Laboratory Section, American Public Health Association, December, 1911, Havana, Cuba.

In the course of the routine examination of vaccine virus at the Health Department an organism was isolated from one set of ten capillary tubes which corresponded in many of its characteristics to the Bacillus welchii or the Bacillus aërogenes capsulatus, commonly known as the gas bacillus. It produced the typical "Schaumorgane" or foamy organs, due to the evolution of hydrogen gas in the viscera of rabbits, but showed a few variations and cultural differences from the typical gas bacillus, which we shall describe in detail. These variations are mentioned by Welch in the Shattuck lecture delivered before the Massachusetts Medical Society, June 12th, 1900, and he states that this is especially true of spore formation, rapidity of liquefaction of gelatin, presence of capsules, retention of Gram's stain, and virulence. The typical bacillus seems always to have liquefied gelatin, although sometimes slowly, and at times scarcely at all. Glucose, lactose, and saccharose are all fermented by the gas bacillus, but at times the gas production is relatively weak, but this is usually recovered after passage through the body of an animal. Variations in gas production and atypical results in milk and lactose bouillon will be described among the cultural characteristics of the organism which we have isolated.

The organism was recovered by inoculating a glucose fermentation tube with the tube of vaccine, and incubating under anaërobic conditions. The bacillus gave all of the microscopical characteristics of the gas bacillus, being non-motile and taking the Gram's stain, some few of the bacteria, however, decolorizing by this method. The intravenous inoculation of a rabbit, killed and kept at a room temperature for twenty-four hours, showed no apparent formation of gas. Organs from this animal, however when incubated at body temperature for twenty-four hours showed abundant gas formation. Inoculations from the glucose tube into fresh glucose bouillon, lactose bouillon, milk, gelatin, blood serum, and shake glucose agar showed growth only in the glucose bouillon and shake agar tubes. A second rabbit inoculated from the second glucose bouillon tube, killed and placed in the incubator for six hours, then kept at room temperature for eighteen hours, showed abundant gas formation. Cultures from the heart's blood of this animal when inoculated into glucose bouillon, lactose bouillon and saccharose bouillon, fermented all three of these sugars, producing about 50% of gas in the glucose and lactose and about 20% of gas in the saccharose. Litmus-milk tubes inoculated from the heart's blood did not show any apparent change at the end of twenty-four hours, but at the end of forty-eight hours presented the characteristics usually produced by this organism. Gelatin inoculated and incubated for twenty-two days, and then solidified in the ice chest showed no liquefaction.

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* From the Bacteriological Laboratory of the State and City Board of Health, Baltimore, Md.

Atypical characteristics of this organism seem to be the absence of gas production when first isolated, its inability to grow in lactose bouillon, milk and gelatin, and its very slow production of gas when inoculated into the first rabbit. While the cultures from the second rabbit seem to have overcome many of these difficulties, the organism was still atypical from its slow growth in milk, from the non-liquefaction of gelatin, and from the fact that it produced an equal amount of gas in glucose and lactose, whereas the organism described by Welch and Nuttall produced about twice as much gas in lactose bouillon as it did in glucose and saccharose bouillon.

American Journal of Public Health
Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. JULY, 1912. Number 7

$2.00 a year. 20 cents a copy.
Livingston Farrand, M. D., Editor. Selskar M. Gunn, B. S., Managing Editor
Philip P. Jacobs, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

PUBLIC HEALTH AND THE COST OF LIVING

Much is heard nowadays on the street and in newspapers and magazines about the recent increase in the cost of living and anyone who keeps track of his household bills, or gives heed to the condition of his check-book will probably agree as to the reality of such increase. The whole question has now become so acute as to figure prominently in the political platforms of all parties, and in the pleas of candidates for public office, most of whom promise, more or less rashly, that the cost of living shall be promptly reduced, provided only they are elected. State, and even National commissions as to causes and remedies have been suggested or created, and all sorts of theories, reasonable and unreasonable, of cause and cure are under discussion.

Only rarely, however, is any reference made to the fundamental bearing of the increase in the cost of living upon the public health. And yet every hygienist and sanitarian knows that in no other relation is such increase more important. It is not yet much more than half a century since Ireland was desolated by a famine, due to the potato rot, which destroyed one of the chief food supplies of the Emerald Isle; and, even now, hardly a year goes by without great scarcity of food in India or China or some other more or less remote portion of the earth's surface. Among the poorer populations of our great cities, such as New York or London, food, even under the best conditions, is frequently very scarce, so that starvation or semi-starvation confronts hundreds.

Improved transportation and its consequent "shrinkage of the world" which is so characteristic a feature of our time, combined with the beneficent arts of food preservation,—especially canning, desiccation and cold storage,—have made seemingly impossible for the western world shortages of food amounting to famine. And yet, with the rapid increase of population, and the growth of cities, coincident with comparative neglect of agriculture, even the United States are beginning to diminish materially their exports of food and to require for their own people most of the food which they produce.

But any increase in the cost of living, unless accompanied by a corresponding increase in wages and employment, must inevitably result in a diminished food supply, particlarly among those least able to bear it. If the well-to-do were compelled to eat less, very likely the public health might gain thereby; but to diminish the already only barely sufficient or inadequate food supply of thousands of our poorer people, can only mean grave danger to the public health, with an increase of diseases due to malnutrition or under feeding, such as tuberculosis and other common infections, and possibly, scurvy, leprosy, and the like.

All sanitarians, therefore, should do their best to help keep down as far as possible the cost of living, and also to teach the poor and under-fed how to get the most nutriment for their money by taking advantage of proper preparation of the cheaper grades of food.

The mere matter of the grading of food, often dismissed with contempt by superficial observers who seem to assume that in America everybody can and should have the best (that is apparently, the most expensive) is one important key to the solution of the difficulty. Fortunately, the nutritiousness of foods does not depend upon their delicacy, tenderness, taste or appearance, but quite as much upon their wise selection and proper preparation by good cooking, etc. And just here the Pure Food Laws need to be administered with good sense and practical wisdom. For some foods which are not even clean may, under proper treatment by cooking, seasoning etc. yield food which is not only cheap but also safe, appetizing and nutritious.

THE REFERENDUM IN PUBLIC HEALTH

Of much interest to public health officials is the recent decision, of the voters of Los Angeles, as shown by the vote on the tuberculin test. The Health Department of that city favored requiring that milk sold in the city must come from cows which had been proven free from tuberculosis by the tuberculin test. There was much opposition and eventually the question was put to the vote of the people. The decision of the majority was against the test. A very active campaign was waged by the Health Department and the dairy interests but apparently the health officials were unable to impress sufficiently on the minds of the citizens the fact that this test is of proven efficiency and value, and that a considerable proportion of cases of tuberculosis in children are contracted through the consumption of milk from tuberculous cows.

It is difficult matter to educate a large group of voters in a short time of the value of such a test, and the very controversy on the subject which raged in the scientific world undoubtedly gave good ammunition to the opponents of the test. Nevertheless it must be conceded that the vast majority of sanitarians now accept the fact that there is a real and considerable danger to children from milk of cows proven to be tuberculous by this test. No doubt the test is not a perfect one but for want of a better it must be adopted for the present.

Does not this action of the voters of Los Angeles point out a very serious danger and weakness in permitting questions of this kind to be decided by those who cannot be adequately informed of the pros and cons of the question in debate? We believe the precedent set in Los Angeles to be most dangerous. Successful agitators may be able so to sway public opinion that other important policies of health departments will be voted down, and if this should happen it would mark a very backward step in public health work in this country.

IMPORTANT NOTICE CONCERNING THE ANNUAL MEETINGS, WASHINGTON, SEPTEMBER 18–20

The preliminary announcement of the annual meetings of the American Public Health Association will be sent to all members in the course of a few weeks. Meanwhile it seems advisable to draw the attention of the members to the fact that there is going to be undoubtedly an unusually full attendance of the Association, and that most of the members will wait over to attend the Fifteenth International Congress on Hygiene and Demography, which meets in Washington, September 23–28. Several other organizations are to hold their meetings in Washington during the same time as those of the American Public Health Association, and consequently the hotels are going to be very crowded, and it will be difficult to obtain suitable accommodations unless reservations are made promptly. For the convenience of the members of the American Public Health Association the following information concerning hotel accommodations are here made.

WASHINGTON HOTELS.

Ardmore	$1.50 and up, American.
Atlantic	$1.00, $1.50 and $2, European.
Bancroft	$2.50 and up, American.
Bellevue	$1.50, European. $3.00, American.
Buckingham	$2.50 and up, American.
Cochran	$1.50, European. $3.50, American.
Commercial	$1.00, European.

Congress Hall,	$3.00, American.	
Continental	$1.50, European.	
Driscoll	$1.00 and up, European.	$2.50 and up, American.
Dewey	$3.50, American.	
Donald	$2.50, American.	
Fritz Reuter	$1.00 and up, European.	
Gordon	$3.00, American.	
Grafton	$3.00, American.	
Hamilton	$2.50, American.	
Harris	$1.00, European.	
Howard	$1.50, European.	
Johnson	$1.50, European.	
Manhattan	$1.00, European.	
Metropolitan	$2.50, American.	
National	$1.00, European.	$2.50, American.
New Ebbitt	$1.50, European.	$2.50, American.
New Fredonia	$1.50 and $2.00, European.	
New Willard	$2.50 and up, European.	
Powhattan	$1.50 and up, European.	
Raleigh	$2.00 and up, European.	
Richmond	$1.50, European.	$3.00, American.
Shoreham	$2.00 and up, European.	
St. James	$1.00, European.	
Winston	$1.00 and up, European.	

HEADQUARTERS.

The local committee has been able to make arrangements with the New Willard Hotel, so that this place will be the official headquarters of the Association. Meetings of the General Sessions of the Association and all meetings of the five sections will be held at this hotel.

TYPHOID FEVER IN NEW YORK CITY TOGETHER WITH A DISCUSSION OF THE METHODS FOUND SERVICEABLE IN STUDYING ITS OCCURRENCE

(*Continued*)

CHARLES F. BOLDUAN, M. D.,

Assistant to the General Medical Officer, Department of Health of the City of New York.

FLY TRANSMISSION.

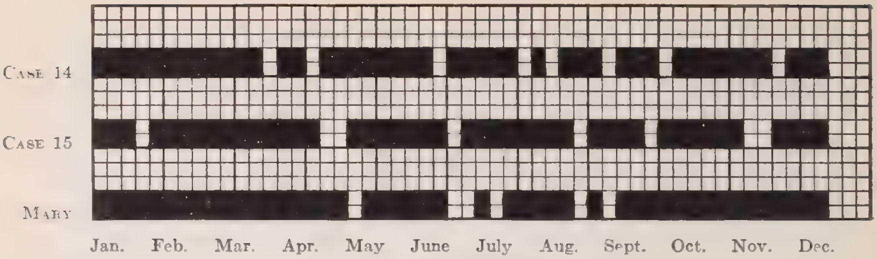
The importance of fly transmission in accounting for the occurrence of typhoid fever has been emphasized by recent writers. Jackson, in particular, has made careful statistical investigations of the parallelism existing between the greatest prevalence of flies and the occurrence of typhoid fever and other diarrhoeal diseases, and has added considerably to our knowledge concerning this mode of transmission. He adduces figures to show that the great increase in typhoid fever every fall is due to a large extent to fly infection. To be sure in large cities a goodly proportion of the cases developing at that time represents out-of-town infections. Thus in New York City approximately one-fifth of all the cases occurring are imported. It is sometimes stated that fly transmission can play only an insignificant part in cities having good sewerage systems. While it is true that sewers enormously decrease the opportunity for flies to become infected, careful inspections in city districts showing unusual prevalence of typhoid fever will often disclose the presence near-by, of vacant lots littered with garbage, rubbish, and fecal deposits. Moreover, as Jackson has pointed out for New York, the mouths of sewers discharging into a river constitute a possible source of infection, for at low tide many of these are found to be at considerable distances above the water and not only accessible to flies but actually swarming with them. It is said that a feature of fly transmission in large cities is the occurrence of the cases in little foci. Now and then the district may be found to contain "school sinks." The possibility of fly transmission must always be kept in mind in studying milk-borne outbreaks of typhoid fever apparently due to infection carried from a single milk shop. If no case of fever has previously occurred in the storekeeper's household, and if the presence of a carrier has been excluded, one should determine the possibility of fly infection from a near-by case. Moreover the development of secondary cases by means of fly transmission from the sick room should always be borne in mind. Here may be repeated what was said under water-borne infections. If a lot of day laborers have been working near the infected district shortly before the onsets of the cases, it is well to investigate the disposal of their excreta, and then see whether fly transmission from infected excreta caused the outbreak. Unless the chain of evidence is very strong that this was the case it is advisable to exhaust all the other possible explanations first before accepting this.

In his extensive investigations concerning the prevalence of typhoid fever in certain parts of Germany, Koch concluded that infected material was often directly carried from such fecal deposits on the shoes of persons stepping into them. Especially was this likely to be the case in regions where human excreta are used for fertilizing purposes. In this country it is very exceptional to find this use made of human excreta; but the point should be borne in mind when dealing with foreigners.

Personally, I have not yet encountered an outbreak of typhoid fever in this city positively traced to fly transmission. I do not wish to be understood as denying that this mode of infection occurs, but I do not believe that in New York City fly transmission is very common. The difficulty of demonstrating the point, however, is very great. The parallelism noted by Jackson as existing between the prevalence of flies and the incidence of typhoid fever does not necessarily indicate that flies are responsible for the usual autumnal rise in the deaths from that disease.

BACILLUS CARRIERS.

A great deal of attention is now paid, in typhoid investigations, to the subject of typhoid bacillus carriers. It is unnecessary in this article to define what is meant by such a carrier. Certain facts in connection with this subject, however, are of the greatest significance to the student of typhoid fever epidemics. The average of a large number of investigations has shown that about three per cent. of persons convalescing from typhoid fever become bacillus carriers. Regularly repeated examinations of the stools of these individuals has shown that the excretion of typhoid bacilli is not constant, not uniform. A positive stool showing only one or two typhoid colonies per plate is often followed by one showing almost a pure culture of the organism, or a negative stool is followed by a positive one. This intermittency must constantly be remembered in undertaking investigations for the discovery of such carriers. The following table exhibits regular *weekly* examinations made on three typhoid bacillus carriers at the Research Laboratory by Miss Noble:



Shaded portion indicates: Typhoid Bacilli found.

From such a chart one might be tempted to conclude that chronic bacillus carriers could usually be recognized by two consecutive stool examinations made a week apart. This, however, is erroneous. The literature contains instances where the intermissions were occasionally of considerable duration.* These cases are usually spoken of as intermittent carriers. Case 17 of the series examined by Miss Noble belongs to this category. The result of the examinations was as follows:

Stool tested after 5 months after typhoid fever—Positive.
" " " 6 " " " " —Negative.
" " " 7 " " " " —Negative.
" " " 8 " " " " —Negative.
" " " 20 " " " " —Positive.

A similar condition may account for the results obtained in a typhoid carrier discovered by us in connection with a milk-borne outbreak of typhoid fever in 1910. After finding the typhoid bacilli in the first specimen, sixteen subesquent specimens, we were informed, were sent to another laboratory and no typhoid bacilli ever found, When again examined at our laboratory, a year later, three out of four consecutive specimens showed typhoid bacilli.

When we consider that the milk supplied to the City of New York comes from over 40,000 dairy farms and that about 200,000 persons thus come into more or less direct contact with the milk, the difficulty of the problem of safeguarding the milk against infection becomes apparent. So far as typhoid infection is concerned, the chief difficulty is presented by what are known as typhoid bacillus carriers. In dealing with milk of the grade known as certified or guaranteed, which sells at retail for fifteen cents a quart and upward, probably little difficulty will be encountered in enforcing rules for the careful bacteriological examination of all persons in any way handling the milk, and then excluding any who are found to be typhoid carriers. With the cheaper grades of milk, and these constitute the bulk of the supply, no such scheme appears to be practicable. At the same time, before attempting to deal with this problem, it is well to know just how much of a menace to the public health these typhoid carriers constitute.

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* As much as two and even three years, in *untreated* carriers.

While subject to considerable variation, the incidence of typhoid fever per 100,000 of population averages, in this part of the country, from 150 to 200 cases annually. This would imply from 300 to 400 cases each year among 200,000 persons coming into contact with the milk supplied to New York City. If only two per cent. of these become chronic carriers,* we should have six to eight new carriers developed each year. We have no data whatsoever on the average time for which a carrier remains such. One of the first cases reported in the literature related to a woman who had had her typhoid infection nineteen years prior to her discovery as a carrier. I have reported a case in which the carrier had had his typhoid infection forty-six years before. He remained such until his death. Even assuming that fifteen years is the average period for which a carrier remains such, this gives us the startling total of 90 to 120 typhoid carriers now probably menacing the milk supply of this city.

Statistically, this may be tested another way. Some time ago I had occasion to study the typhoid fever incidence of a group of dairy farms from which infection was thought to have occurred. Altogether 190 dairy farms were visited, and on these the total population, including household and hired help, was 818. The total number of individuals among this number who gave a history of typhoid fever at some time in their lives was 26, and 5 others gave a history of a disease which may have been typhoid fever, but which was called either grip, or acute biliousness, or typhoid-pneumonia.

Let us say, therefore, that 190 dairies yielded typhoid histories in twenty-eight instances and that there are approximately 40,000 dairies supplying New York. If the same incidence holds good for all the dairies, we should have 210 times 28 instances, *i. e.*, 5,880 persons giving typhoid histories. Two per cent. estimated as carriers would mean 115 carriers on the dairies supplying New York.

The labor involved in collecting and examining stools for typhoid bacilli, is considerable and has led to attempts to employ Widal examinations preliminary to undertaking stool examinations. This, of course, is based on the assumption that all typhoid bacillus carriers will give a positive

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*This is probably a very conservative estimate, when very careful, and oft repeated examinations are made of those convalescing from typhoid fever have been made, as high as five per cent. have been found to be carriers.

Widal reaction, an assumption which extended investigations have shown to be false.

While, perhaps, the large majority of typhoid bacillus carriers thus far studied have harbored the bacilli in their faeces, and some in both faeces and urine, a number appear to harbor them only in the urine. The latter, of course, will be overlooked if only stools are examined; and since they are really the more dangerous of the two, it follows that in searching for typhoid bacillus carriers both stools and urine should be examined. At this point attention may be called to a regulation which we have enforced for some time in dealing with typhoid fever on dairy farms or among employees of creameries. When such a person has typhoid fever, not only do we insist on rigid quarantine, but we also refuse to allow him to return to work in the dairy or creamery until after three consecutive bacteriological examinations have shown him no longer to be excreting typhoid bacilli.

SECONDARY INFECTIONS.

The immediate object of all statistical inquiries such as are here outlined, should be to secure information which will help us to prevent the occurrence of infections. It is often stated that the proportion of cases secondarily infected is probably considerably higher than ordinarily believed. Nevertheless, when we come to study the question we find that the available data concerning the circumstances surrounding the occurrence of such infections are far from complete. My personal experience leads me to believe that the proportion of secondary infections in this city is distinctly smaller than it is in the country. This is quite natural in view of the hospital facilities available to the city resident, the sewage disposal provided, and the circulars of information distributed to all the patients by the Department of Health. Some light is thrown on the cause of the secondary infections by studying their incidence on the occupation of the cases, and on the member of the household who nursed the patients, and on patients kept at home and those sent to hospitals. A frequent cause of secondary infections is the fact that the patient is nursed by the wife or mother, as the case may be, and that circumstances practically compel her also to attend to the cooking and other household duties for the rest of the family. This is well shown in the following detailed study of thirty-one families in which undoubted cases of secondary infections occurred.

Total number of families	31
" " " infections	81
" " " secondary infections	50
The nursing person secondarily infected	13 cases

Infection due to same person doing both nursing and cooking for the rest of family (19 such instances)	31 cases
An infected person continuing cooking, etc., during beginning of the illness	5 “
Infection by frequent, close contact	1 case
	50 cases

So far as our records show, about ten per cent. of the typhoid infections occurring in this city are secondary and probably to a large extent avoidable. At the present time this represents three or four hundred secondary cases annually, of which approximately ten per cent. are fatal. Public health authorities should consider the advisability of enforcing hospital treatment in all cases of typhoid fever where the patient cannot be isolated and cared for by a special nurse.

OCCUPATION.

In the preceding pages we touched upon the danger to others when typhoid fever occurs in a dairyman or an employee of a creamery, and in speaking of secondary cases mention was made of typhoid fever in its relation to housewives. Moreover, the literature contains cases similar to the well-known cook who was under our observation for several years and who left a trail of typhoid infection in the families in which she was employed. Last year we began to gather accurate data concerning the occupation of all reported cases of typhoid fever and especially as to what relation the occupation bore to the handling of food. The following table gives these data concerning 700 cases.

Total number of cases tabulated	700
Children	157 cases
Remainder	543 “
Not handling foods (including also a few in which no data were obtained)	447 “
Occupations in some way connected with the handling of food	96 “
These were distributed as follows:	
Housewives	53 cases
Waiters	13 “
Cooks (Private)	5 “
Cooks (Hotel or Restaurant)	4 “
Bartenders	4 “
Bakers	3 “
Kitchen helpers	3 “
Maids	2 “
Grocery clerk	1 case
Confectioner	1 “

Carrying out the same principle by which we now insist on negative bacteriological stool examinations before allowing dairymen and other handlers of milk to return to their occupation, it would seem, from the above table, that similar methods should be applied to typhoid fever occurring in individuals who hire out as cooks and waiters. The administrative control of these cases, to be sure, is much more difficult, but this should not deter us from dealing with the subject.

RELATION BETWEEN DATE OF ONSET AND DATE OF REPORT.

In studying the occurrence of typhoid fever in previous years it usually happens that only the dates on which the cases were reported are available, and not the dates of onset. If then we know the average time elapsing between the date of onset and date of report, this fact would enable us to plot a curve of onsets, from which, in turn, we could infer the time of infection with a fair degree of accuracy.

The average time elapsing between the date of onset and date of report is influenced by a number of different factors, and *varies considerably in different communities.* In general, the time is a little longer in the winter and spring months than in the summer and fall, owing probably to the fact that physicians are less on the lookout for the disease in the winter and spring seasons. Conversely, the cases are reported more promptly during times of epidemic outbreaks. Institutional cases, especially when occurring in groups are usually quickly recognized, and consequently reported within a short time of their onset. In cities, such as New York, where the laboratory diagnostic facilities placed at the disposal of physicians are very great and where, therefore, a large number of cases of typhoid fever come to be reported indirectly by means of positive Widal reactions on specimens sent to the municipal diagnosis laboratory, the time elapsing between onset and date of report is, undoubtedly, considerably less than in communities where such facilities are not provided or are not readily available.

In general, I find that in New York City the time between onset and date of report is about two weeks, with thirteen days as the average in the summer and fall, and fifteen days in the winter and spring. When dealing with fairly large numbers of cases, therefore, a tolerably accurate idea of the date of onset may be obtained by moving the curve of "date reported" back just two weeks.

Owing to the greater certainty, so far as diagnosis is concerned, of death returns as compared with case returns, a number of investigators have based epidemiological studies on the curve of date of death, and have then counted back an interval of a certain number of weeks in order to arrive at the time of infection. For this purpose it is necessary to know the average time elapsing, in the fatal cases, between date of onset and date of death, and to this period add the average incubation period. From an analysis of 222 fatal cases occurring in New York in 1911, I find that the average time from date of onset to date of death is 25.4 days. Adding an incubation period of 11 days to this makes 37 days, or adding 16 days makes 42 days. In other words one should set the death curve back not over six weeks in order to arrive at a curve representing the period of infection.

EXTENT TO WHICH TYPHOID FEVER CASES ARE REPORTED IN NEW YORK CITY.

For certain purposes, it is often of advantage to base studies on the cases rather than on the deaths reported. One should remember, however, that in many instances this is not an accurate index to the number of typhoid infections actually occurring. Much depends on the completeness and readiness with which physicians report the cases coming under their care. For this reason it is often more accurate to guage the typhoid incidence by means of the reported deaths. When dealing with large numbers of cases, it is safe to say that the average case mortality will not be far from 10 to 12 per cent., and we may therefore multiply the number of reported deaths by eight to ten in order to estimate the total number of typhoid infections. By this method we are enabled to approximately determine also the completeness with which the cases are being reported to the health authorities. In this connection, the table at the end of this article is of considerable interest. It will be seen that the calculated case mortality differs considerably in the different boroughs of the city. At least that is what the figures show. As a matter of fact, however, the figures really indicate that the cases are being very poorly reported from certain of the boroughs. Applying the rule we have just laid down, namely that the average case mortality is probably 10 to 12 per cent., it will be seen that the number of unreported cases in the entire city of New York is still considerable. It is impossible at present, to say what proportion of these represent either mild or typical cases whose ready diagnosis is hardly to be expected.

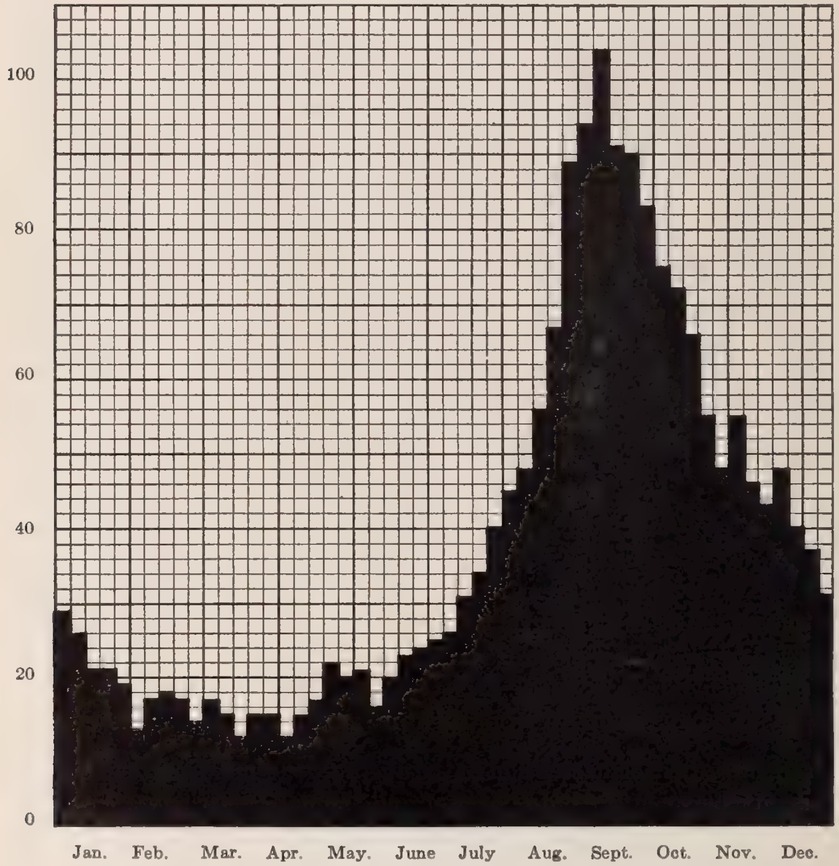
SEASONAL DISTRIBUTION OF TYPHOID FEVER IN NEW YORK CITY.

I have already called attention to the average length of time which elapses in this city between the date of onset and the date on which a case of typhoid fever is reported and also between the date of onset and date of death. I called attention there to the fact that the interval between the onset and date of report will vary considerably in different communities. This variation, however, does not apply to the interval between onset and death and for this reason comparative studies of the seasonal distribution of typhoid fever in different communities should be based by preference on the deaths reported rather than on the cases reported. The latter, to be sure, may also be used provided one can accurately and conveniently learn the date of onset. Practically, however, such comparative statistics based on date of onset are almost impossible to obtain.

The seasonal distribution of typhoid fever in this city is shown in the following curves. It will be seen that the curve is at its ebb in the early spring months and that it rises rather sharply in the fall. I have introduced the curve for 1907 in order to bring out the abnormal rise produced by

MANHATTAN AND BRONX

Seasonal distribution of Typhoid Fever Cases according to date of report. An average of 10 years normalized.

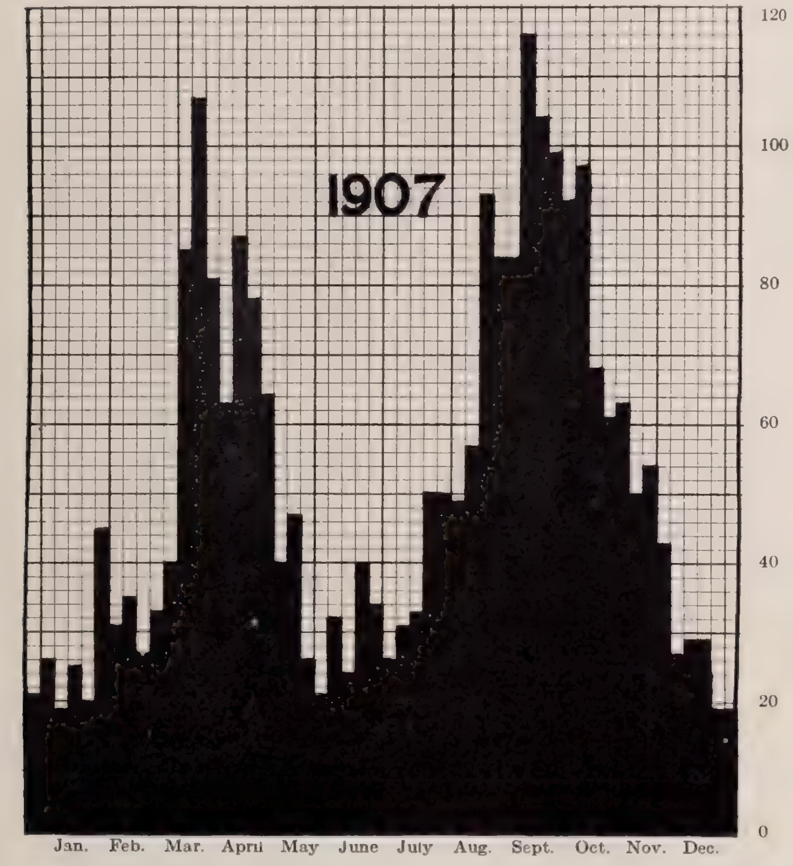


a rather extensive water-borne outbreak in the spring of that year. These curves are all based on the date of the cases reported. In order to arrive at the date of onset the curve must be moved back two weeks. In making comparisons with other cities, it will be best to use the death curve of these cities and to move the death curve back about four weeks in order to obtain a date of onset curve.

COLLECTION AND EXAMINATION OF SPECIMENS.

Specimens of stool are collected in a clean sputum bottle, which need not be sterile. A small piece of fecal material, about the size of a chestnut, is sufficient, and it is well not to take the first hard portion passed. The bottle should be securely corked, and labeled with the patient's name and date of collection. If the patient collects the specimen, it is important to instruct him not to add any disinfectant to the specimen. Such instructions are especially important if a trained nurse is in attendance and collects the specimen, as the disinfection of suspected typhoid stools is almost a routine matter with them.

Cases of Typhoid Fever in the Boroughs of Manhattan and The Bronx, as reported week by week.



Specimens of urine should be collected in sterile bottles holding about eight ounces. The bottle should be only partly filled to allow of expansion with change of temperature. The specimen should be kept moderately

TYPHOID FEVER IN CERTAIN LARGE CITIES OF THE WORLD

Deaths per 100,000 Population

Year	Berlin	Hamburg	Vienna	Paris	London	New York	Boston	Chicago	Washington, D. C.	Philadelphia
1890	9.1	26.2	9.4	28.2	14.8	21.8	34.6	91.6		63.6
1891	10.4	26.2	6.2	22.7	13.0	22.8	33.6	173.8		63.9
1892	8.3	34.5	8.3	28.0	11.4	21.9	29.3	124.1		40.3
1893	9.4	17.6	8.0	22.8	16.7	21.7	31.0	53.5		40.9
1894	4.2	6.0	5.1	27.4	14.6	18.0	29.0	37.5		32.5
1895	5.7	9.2	5.8	10.6	14.0	17.1	32.5	37.9		40.3
1896	4.7	5.4	5.2	10.1	13.4	14.1*	31.4	52.6		33.8
1897	4.0	7.1	5.4	9.7	13.3	15.4	32.7	29.3		33.2
1898	4.3	4.6	6.8	9.9	13.0	20.7	34.0	40.8	60.6	51.5
1899	4.1	3.7	4.1	29.0	17.8	16.3	29.7	27.2	60.7	74.9
1900	5.8	3.4	8.3	34.6	16.5	20.8	25.5	19.8	77.8	34.7
1901	4.7	4.	4.5	15.8	12.1	20.6	25.0	29.0	61.4	33.6
1902	2.7		3.0	15.7	12.0	20.3	24.2	44.1	79.1	43.6
1903	3.2		3.9	13.7	8.6	17.1	20.5	31.4	48.8	69.4
1904	3.7		3.4	15.4	2.6	16.8	22.9	19.6	47.0	52.8
1905	5.3		4.4	11.2	5.2	16.0	19.6	16.9	48.2	47.6
1906	4.6	4.	4.9	13.5	5.8	15.4	19.9	18.5	52.3	72.4
1907	3.8	3.	2.6	10.0	4.3	17.2	10.2	18.4	34.6	59.3
1908	3.6	4.	4.3	8.3	5.1	12.0	24.7	16.1	36.5	34.8
1909	4.4	3.	3.0	9.4	3.	12.2	13.9	12.6	33.2	21.1
1910	3.6	2.5	4.1	6.7	4.	11.6	11.6	13.7	23.2	17.4
1911						10.9				14.1

*Greater New York.

TYPHOID FEVER IN NEW YORK CITY

Cases, Deaths and Death Rate per 100,000 in Each Borough, 1900–1911

Year	Greater City			Borough of Manhattan			Borough of the Bronx			Borough of Brooklyn			Borough of Queens			Borough of Richmond		
	Cases	Deaths	Death Rate	Cases	Deaths	Death Rate	Cases	Deaths	Death Rate	Cases	Deaths	Death Rate	Cases	Deaths	Death Rate	Cases	Deaths	Death Rate
1900	2,658	718	20.8	1,658	342	17.1	101	30	17.1	697	301	24.0	117	32	24.0	85	13	18.8
1901	2,748	727	20.6	1,860	380	20.3	85	32	14.5	644	272	22.5	81	27	16.6	78	16	23.2
1902	3,871	765	20.3	2,524	366	18.7	105	34	14.0	961	322	25.8	202	32	18.5	79	11	15.5
1903	3,671	653	17.1	2,342	317	15.7	120	33	12.3	1,003	267	20.6	119	22	12.0	87	14	19.2
1904	3,412	661	16.8	1,916	277	13.8	220	32	10.9	1,050	303	22.7	133	34	17.6	93	15	20.0
1905	4,326	649	16.0	1,867	273	12.9	327	37	12.0	1,913	297	21.6	146	31	15.1	73	11	14.4
1906	3,467	639	15.4	1,713	325	15.1	301	44	15.2	1,215	230	16.4	166	30	14.3	72	10	13.4
1907	4,426	740	17.0	2,387	372	16.9	384	48	15.0	1,341	271	18.0	171	36	16.0	143	13	19.0
1908	3,058	536	12.0	1,455	254	11.3	333	37	11.3	999	206	13.8	200	32	13.7	71	7	9.3
1909	3,499	564	12.3	1,556	262	11.4	459	63	18.0	1,131	119	12.4	234	37	15.1	119	11	14.1
1910	3,582	558	11.8	1,884	269	11.5	289	41	11.0	1,113	198	12.4	215	39	15.1	81	11	13.6
1911	3,450	545	11.1	1,733	257	11.1	402	38	9.0	1,104	211	12.3	171	28	9.0	40	11	12.3
Total	42,168	7,755		22,895	3,694		3,126	469		13,171	3,069		1,955	380		1,021	143	
	Case fatality 18.3%.			Case fatality 16.1%.			Case fatality 15.0%.			Case fatality 23.3%.			Case fatality 19.4%.			Case fatality 14.0%.		

NOTE.—In connection with the calculated case fatalities it is important to remember what was said in discussing the Extent to which Typhoid Fever Cases are Reported in New York.

cool, but not frozen, and together with the specimen of stool should be promptly sent to the laboratory.

At the laboratory a loopful of faeces is broken up and mixed thoroughly in a tube containing about five or six c.c. sterile liver broth (Jackson) and a loopful from this dilution is streaked over a Conradi-Drigalski plate. The typhoid-like colonies which develop at 37C. are then fished into broth and incubated for twenty-four hours. These fishings are then tested for their agglutination characteristics with an antityphoid horse serum.

The liver broth culture is incubated for three days, which serves as an enrichment period, for this medium favors the growth of typhoid bacillus at the expense of certain other intestinal bacteria. At the end of this time, streak cultures are made of Conradi-Drigalski plates as has just been described, and are fished and tested in the same way.

To make certain that an organism agglutinating with typhoid horse serum is really typhoid, the degree of agglutination must be carefully determined and the fermentation characteristics of the bacillus compared with those of a typical typhoid bacillus. Absorption tests may also be made but, except in rare cases, will not be needed.

The examination of the urine is carried out in exactly the same way.

In the preparation of the study here presented, the writer has drawn generously on the work of others in the Department of Health, especially on that of Dr. William H. Park, Director, and W. Carey Noble, Bacteriologist of the Research Laboratory, Dr. John S. Billings, Chief, and Dr. William T. Klein, Medical Inspector in the Division of Communicable Diseases, and Messrs. Kilbourne, Sturgis, Salte, Thompson and De Wolfe of the Milk Division. To all who have thus aided him, the writer here expresses his thanks and appreciation.

DRIED VACCINE

W. F. Elgin, M. D., and J. Gilbert George,
H. L. Mulford Laboratory, Glendolden, Pa.

Read before the Laboratory Section, American Public Health Association, Havana, Cuba, 1911

At a meeting of this Association in 1905, we read a paper, discussing among other Vaccine Problems the "Forms of Preparing Vaccine" in which some experiments were cited, intending to prove the relative keeping qualities of the dried virus under ordinary heat as compared with the glycerinated form. This work was suggested by a paper from Carini of Berne, explaining extraordinary resistance of dried virus to heat. Our method of drying virus at that time was by driving a blast of sterile air over the virus until the water was extracted. Tests appear to indicate that the virus thus dried was inferior to the glycerinated form, and the matter was dropped.

About a year ago, inquiries began to come in from various points in tropics regarding dried vaccine. It was therefore determined to again take up the investigation, drying the virus in vacuum over sulphuric acid.

This method in detail was as follows:

As soon as possible after its removal from the animal, the virus was placed in an appropriate container inside a large Fruhling & Schultz Desiccating jar with sulphuric acid in the bottom. The desiccator was placed in a cool place near an open window, and a vacuum of approximately twenty-eight inches was maintained for two or three days. After drying the virus, it was removed and ground in a mortar; then passed through a sterile wire sieve (32 mesh to the inch).

In accordance with this method, on December 17th, 1910, we dried 102.7 grms. of virus from Calf No. 121 "A." After drying, the virus was transferred to small tubes containing about 1–10 gram each, hermetically sealed under a vacuum of approximately twenty-eight inches. These vials were exposed to varying temperatures, such as 37° C., 20° C. room temperature (on Laboratory table) and Ice Chest (Approximately 10° C.) The bulk of the material was transferred to cold storage at a temperature of about 8° C. On January 6th, 1911, this material was tested on Calf No. 4 "B," results showed no especial advantage of the dry over the glycerinated form.

A number of other experiments were made along this line, varying only slightly in detail, but the virus proved of little value for the purpose intended.

Finally the Technique was changed, so as to dry the material quicker, and was as follows:—

On March 31st, 1911, Twenty-five grams of virus were taken from Calf No. 116 "B," placed on a desiccator with sulphuric acid in bottom and tray of sulphuric acid above the virus. The air was exhausted to about twenty-eight inches. The jar being exposed to ordinary out-door temperature, at an open window. At the end of twenty-two hours, the material was found to be dry, was ground in a mortar, and put through a sieve and put up in vials as before noted.

Tests on this showed a decided improvement, although not so great as we anticipated.

Twenty hours in Temperature 37° C. showed a large number of vesicles of a better type than those noted from the same calf put up in the glycerinated form, and tested in the same way.

During the summer, inquiries in reference to this product continued to come in; and it was decided to continue our investigations in the light of research made by Drs. Harris and Shackell in reference to *"The Effect of Vacuum Desiccation on the Virus of Rabies," and reported to this Association at its last meeting. Dr. Harris seems to believe that the infectivity of the rabies cord, largely depended upon the amount of water abstracted, and suggested the importance of keeping the tissue frozen while drying.

Bearing these points in mind, our method was again altered, so as to pack the desiccator in ice and salt during the process of drying. The material was immediately removed from the desiccator when dry, sieved, and crushed in a mortar, and put up in air exhausted tubes as before.

This general idea was carried out with varying details during the past fall and with poor success. For some reasons, just why we do not know, the virus made and handled in the heat of the summer and early fall, seemed to be of less value and would not stand the various manipulations in the same manner as virus made in the winter; so that our results were too indefinite to be worthy of report.

In November, however, we took some virus which had been placed in Cold Storage last winter, and subjected it to the conditions as to the temperatures noted in a previous experiment, as follows:—

November 8th, 1911 No. 128 "A" was exposed to the following temperatures: 37° C., 20° C., and Ice Chest (approximately 12° C.)

On November 21st. Samples from each of the temperatures were vaccinated on Calf No. 114 "C." Inspection on November 27th, showed equally good takes for all these temperatures. Similar results were noted on tests from other viruses treated in a like manner. Though the results were not always constant we are encouraged to continue our investigations in the hope that we may attain results similar to those reported by †M. Achalme and Dr. Phisalix from this form of virus in tropical countries.

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*Journal of Infectious Diseases; Vol. 8, No. 1, January, 1911, pp. 47–49.

† Lancet—London, October 7th, 1911.

MINUTES OF THE THIRTY-NINTH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

(*Concluded.*)

MINUTES OF THE HAVANA MEETING.

Third Day.

HAVANA, CUBA, December 7, 1912.

The meeting was called to order in the Ateneo, at ten o'clock, a. m., December 7, 1911, by the President.

The reading of the minutes of the preceding meeting was by unanimous consent dispensed with.

A report was received from the Laboratory Section, announcing the election of officers as follows:

Chairman, Dr. John F. Anderson,

Vice-Chairman, Prof. Fred P. Gorham,

Recorder, Dr. Allen W. Freeman,

Secretary, Mr. Burt R. Rickards,

Elective members of Council: Dr. John A. Amyot, Prof. Edward Bartow, Dr. D. L. Harris, Dr. A. Parker Hitchens, and Mr. James O. Jordan.

Representative on Advisory Council, Dr. John A. Amyot.

A report was received from the Section on Vital Statistics, announcing the election of officers, as follows:

Chairman, Dr. Wilmer R. Batt,

Vice Chairman, Dr. Jorge LeRoy,

Secretary, Dr. David N. South,

Elective members of Section Council: Dr. Peter H. Bryce, Dr. William H. Guilfoy, Dr. Martin O. Heckard, Dr. Gregorio Mendizabel, and Dr. William F. Snow.

Honorary and Advisory member of Section Council, Dr. Cressy L. Wilbur;

Representative on Advisory Council, Dr. William H. Guilfoy.

The Section of Municipal Health Officers reported the election of the following officers:

Chairman, Dr. Joseph S. Neff,

Vice-Chairman, Dr. James Roberts,

Recorder, Dr. Alton S. Fell,

Elective members of Section Council: Dr. Julio Arteaga, Dr. Francis

E. Curtis, Dr. Alexander J. Douglas, Dr. Robert Nelson, and Dr. William F. Snow.

Representative on Advisory Council, Dr. Francis E. Fronczak.

The Secretary, Dr. Ernest C. Levy, having been elected in 1910, to serve two years, holds over.

The Executive Committee reported that it had carefully considered the pending amendment to Article III, Section 6, of the Constitution, to wit, the adding of the words "and to such others as the Executive Committee may recommend as presenting satisfactory qualifications in lieu of the three years' service specified above," and had considered also the amendment proposed to said amendment, which would have the effect of abolishing the existing distinction between active membership and associate membership. The Executive Committee recommended that the proposed amendment to the constitution be adopted in the form in which it was originally submitted.

Dr. Bryce moved the adoption of the report of the Executive Committee. Carried unanimously.

The Executive Committee reported that it had considered the proposed amendment to Chapter 10 of the by-laws, offered by Dr. Guion yesterday and referred to the Executive Committee, the purpose of which was to enable the Committee of Seven to make such amendments to the by-laws as may be necessary to make them conform to the requirements of the postal laws and regulations of the United States. The Executive Committee found, however, that the Committee of Seven is already vested with such authority, and the Executive Committee therefore recommended that the amendment referred to be laid on the table.

Dr. Robert W. Bell moved the adoption of the report of the Executive Committee. Carried unanimously.

With respect to the adminstration of the business affairs of the Association, referred to the Executive Committee as a part of the report of the Secretary, and with reference to the report of the Committee on Journal, which was referred to the same committee, the Executive Committee reported that it had appointed a sub-committee to consider these matters and that that sub-committee had submitted a report, as follows; which was duly approved by the Executive Committee:

Your sub-committee has considered the various methods possible for conducting the work of the Association and publishing the transactions and keeping up a permanent journal, as follows:

(1) Having a secretary, assisted by a committee, publish the transactions in a volume as was formerly done.

(2) Arranging with some existing journal to print the transactions as prepared and edited by the Publication Committee, as a part of that journal, the American Public Health Association paying for such service.

(3) Appointing from the Association some person at an adequate salary to be secretary and treasurer, and editor and business manager of the Journal, utilizing such trust funds as are necessary, up to a fixed sum approved by the Committee of Seven.

(4) Arranging, if possible, with the secretary and editor of some existing journal dealing with some phase of public health work, who is a member of the Association, to be secretary and treasurer of the Association, and publisher and business manager of the Journal, paying him a partial salary and for office assistance, the person so appointed to guarantee such part of the income from advertising and other sources of revenue as may be agreed upon by the Committee of Seven on behalf of the Association.

After fully considering the various proposed methods, your sub-committee is of opinion that the fourth plan will best meet the present needs of the Association, keeping in view both the present financial ability of the Association and the aims which the Association has for several years past been pursuing, for the purpose of developing the efficiency of the Association.

As this method, if adopted, will require some time to put into effect, your sub-committee reports that the present Editor of the Journal of the Association has agreed to take charge of the next issue of the Journal and that the Secretary has agreed to continue to act in his present capacity, in order that the Committee on Journal may have time to make, if possible, arrangements along the lines laid down in this report.

The Executive Committee recommended therefore the adoption of the following resolution: "Resolved that the report of the special sub-committee of the Executive Committee, duly approved by the Executive Committee, be adopted and that this report be referred to the Committee on Journal, with instructions to carry out as far as possible the recommendations contained in plan four, proposed by the sub-committee, and that should the Committtee on Journal find it impossible to carry these recommendations into effect, said committee be authorized to make such other business arrangements for the continuation of the Journal during the coming year as may be necessary and be authorized to draw upon the trust funds of the Association up to such amount as the Committee of Seven may deem necessary."

Dr. Bryce moved that the resolution submitted by the Executive Committee be adopted. Carried.

A report was received from the Committee on Membership, duly approved by the Executive Committee, showing the eligibility of each of the applicants named below for election of the class of membership specified.

December 7, 1911.

ACTIVE.

NAME	ADDRESS
Agramonte, Dr. Eugenio S.	Havana, Cuba.
Dresslar, F. B., Ph. D.	Bureau of Education, Washington, D. C.
Bisbe, Jose, M. D.	Santiago, Cuba.
Cartaya, Jose, M. D.	Havana, Cuba.
Castro, Raimendo, M. D.	Havana, Cuba.
Croston, John F., M. D.	83 Emerson street, Haverhill, Mass.
Cueto, Antonio, M. D.	Havana, Cuba.
Jacobson, Joaquin L., M. D.	Havana, Cuba.
Poling, James A., M. D.	Old Colony Building, Freeport, Ill.
Ponce de Leon, Nestor J., M. D.	Havana, Cuba.
Smith, R. Morton, M. D.	Riverpoint, R. I.

Dr. Cole moved that the Secretary be authorized and directed to cast the ballot of the Association for the applicants named. Carried.

The ballot having been cast by the Secretary, as directed, the applicants named were declared duly elected.

Dr. Woodward moved that the Committee on Journal consider the feasibility of publishing in eleven of the monthly issues of the Journal, the proceedings of the Association in English and publishing in the twelfth issue a summary of the proceedings in Spanish. Carried.

Dr. Levy offered the following amendment to Article V, Section 8 of the Constitution:

Add to the first paragraph, the following: "Members of the Advisory Council representing States, provinces, territories, or districts shall be selected by the active members of the Association of each State, province, territory, or district present at each meeting, and their selection shall be reported in writing to the Secretary. In event of the failure of any such delegation so to report, the Executive Committee shall nominate the representatives of such jurisdiction on the Advisory Council or authorize the President to do so."

The President stated that under the constitution this amendment would lie over until the next annual convention.

Dr. Stokes offered the following resolution from the Laboratory Section:

"Resolved, that the Council of the Laboratory Section recommends urgently that the report on Standard Methods of Water and Sewage Analysis be published as early as possible, owing to the fact that orders amounting to about $150.00 have already been received by the editor."

By unanimous consent this resolution was referred to the Executive Committee.

Papers were then read as follows:

Recent contributions to our knowledge concerning infantile paralysis, by Dr. Mark W. Richardson, Secretary, Massachusetts State Board of Health. Discussed by Drs. Anderson, Slemons, Dowling, Guiteras, Bell, and Roberts.

Urea as a sign in yellow fever, by Dr. F. Villuendas, Inspector General of Sanitation, Havana, Cuba. Discussed by Dr. Guiteras.

The North Carolina campaign against hookworm disease, by Dr. John A. Ferrell, Assistant Secretary for Hookworm Disease, North Carolina State Board of Health. Discussed by Drs. Freeman, Claude A. Smith, Kean, Snow, and Guiteras.

The Conservation of food products by refrigeration, in its hygienic and economic aspects, by Dr. Peter H. Bryce, Chief Medical Officer, Department of the Interior, Canada. Discussed by Drs. Snow, Dowling, Rankin, and James Roberts.

Mr. Frederic D. Bell offered the following resolution: "Resolved, that the question of refrigeration of food products, with particular reference to its wholesomeness, and its effect on the public health, be referred to a committee of this Association, to be appointed by the Executive Committee, with instructions to report at the next annual meeting of this Association." This resolution was referred to the Executive Committee.

Dr. Rankin offered the following resolution: "Resolved, that the Executive Committee be requested to present for approval and adoption at the meeting of the Association to be held on the 8th instant, a resolution requesting the American Association of Medical Colleges to urge upon all medical colleges belonging to that organization the importance of introducing the study of medical sociology into the curriculum." Carried.

The reading of papers was then continued, as follows:

On the milk problem, by Dr. Ernesto Aragon, Medical Inspector, Havana, Cuba, discussed by Dr. Guiteras.

A brief history of pellagra in South Carolina, by Dr. James A. Hayne, Secretary, South Carolina Board of Health. Read by title.

Tuberculosis and Quarantine, by Dr. A. G. Dominguez, Third Health Officer of the Port, Havana, Cuba. Discussed by Dr. Bryce.

Dr. Claude A. Smith moved that a Committee be appointed to consider tuberculosis in its relation to travel and quarantine. Referred to the Executive Committee.

The meeting then adjourned.

ROBERT M. SIMPSON,
President.
WM. C. WOODWARD,
Secretary.

MINUTES OF THE HAVANA MEETING.

Fourth Day.

Havana, Cuba.

The meeting was called to order in the Ateneo, at ten o'clock, a. m., December 8, 1911, by the President.

Dr. Guiteras moved that the reading of the minutes of the preceding meeting be dispensed with. Carried.

The Executive Committee reported that it had considered the resolution concerning the teaching of medical sociology, offered yesterday by Dr. Rankin and referred to the Executive Committee, and that the Executive Committee recommended the adoption of the following resolution:

"Resolved, that the American Public Health Association urges upon all medical colleges the importance of the study of diseases and deformity not only in their relations to the individual but also in their broader relations, bearing upon the morality, happiness, and efficiency of the race. The Association recommends that the study of medicine in these aspects be made a part of the curriculum in every medical college and that the duties of physicians with respect thereto be duly impressed on the students of medicine prior to graduation."

Dr. Wilbur moved that the report of the Executive Committee be adopted. Carried.

The Executive Committee reported that it had considered the resolution referring to tuberculosis in its relation to travel and quarantine, offered yesterday by Dr. Smith, and referred to the Executive Committee, and that the Executive Committee recommended the adoption of the following resolution:

"Resolved, that the President be authorized to appoint a committee of five or more members to consider methods for the prevention of the spread of tuberculosis in public conveyances, particularly with reference to railways and steamboats, and the necessity for taking precautions with respect to passengers suffering from communicable diseases."

Dr. Dowling moved that the report of the Executive Committee be adopted. Carried.

The Executive Committee recommended the adoption of the following resolution:

Resolved, that the President be instructed to appoint a committee on the supervision and control of milk supplies.

Col. Gorgas moved that the report of the Executive Committee be adopted. Carried.

The Executive Committee reported that it recommended the adoption of the following resolution:

"Resolved, that the President be authorized to appoint a committee of three or more members on the conservation of infant life."

Dr. Wilbur moved that the report of the Executive Committee be adopted. Carried.

The Executive Committee recommended the adoption of the following resolution:

"Resolved, that the committees authorized at the last preceding meeting of the Association and not specifically discharged at this meeting be continued, and that the President be authorized to appoint such other committees as to him may seem proper."

Col. Gorgas moved that the report of the Executive Committee be adopted. Carried.

The Executive Committee recommended the adoption of the following resolution:

"Resolved, that the American Public Health Association reiterate the judgment previously expressed to the effect that the importance of the health of the people is sufficient to justify and make necessary the creation of a federal department or ministry of health in each of the countries represented in this Association not now having such a department or ministry."

Col. Gorgas moved the adoption of this resolution. Carried.

The Executive Committee reported that Drs. Batt, Bryce, Holton, and Swarts had been elected by the Executive Committee to serve on the Committee of Seven during the ensuing year.

The report of the Committee on Membership, duly approved by the Executive Committee, was received, showing the eligibility of the applicants named below to the classes specified.

ACTIVE.

NAME	ADDRESS
Biosco, Luis, M. D.	Havana, Cuba.
Blanck, Frederick C.	2141 Linden avenue, Baltimore, Md.
Espin, Jose M., M. D.	Santiago, Cuba.
Figueras, Jesus A., M. D.	Havana, Cuba.
Rodriquez, Eduardo F., M. D.	Saquamla Grande, Santa Clara, Cuba.
White, Joseph H., M. D.	P. H. & M. H. Service, Wash. D. C.

By unanimous consent, the Secretary was authorized to cast the ballot of the Association for these applicants, and the ballot having been cast, the applicants named were declared duly elected.

The Secretary reported that through his oversight the resolution offered yesterday by Dr. Bell, providing for the appointment of a committee to report at the next annual meeting concerning the refrigeration of food products with particular reference to its wholesomeness and its effect on the public health, had not been submitted to the Executive Committee for action. Dr. Woodward moved, in view of the fact that the Executive Committee will not meet again before the adjournment of this convention, that this resolution be recalled from the Executive Committee and that the resolution itself be adopted. Carried.

Reports of the Committee on the Revision of Section constitutions and from the Committee on Cooperation with other National Health Organizations were called for, but no reports were received.

The Advisory Council, through its Chairman, Dr. Juan Guiteras, submitted the following report:

REPORT OF ADVISORY COUNCIL.

The Advisory Council met on December 7, 1911, in the Ateneo, and was called to order by the Secretary of the Association. Upon roll call, representatives responded as follows:

UNITED STATES.

Army, medical department, Col. Jefferson R. Kean, Navy, bureau of medicine and surgery, Dr. William H. Short; public health and marine hospital service, Dr. John F. Anderson; bureau of the census, Dr. Cressy L. Wilbur; bureau of animal industry, Dr. Charles N. McBryde; Alabama, Dr. Robert Nelson; California, Dr. William F. Snow; Connecticut, Dr. Joseph H. Townsend; Florida, Dr. Joseph Y. Porter; Georgia, Dr. John P. Kennedy; Illinois, Prof. Edward Bartow,; Indiana, Dr. John R. Hicks; Louisiana, Dr. Oscar Dowling: Maryland, Dr. Wm. Royal Stokes; Massachusetts, Mr. J. O. Jordan; Michigan, Dr. Clyde C. Slemons; Minnesota, Dr. Robert H. Mullin; Missouri, Dr. W. S. Wheeler; Montana, Dr. T. D. Tuttle; New Jersey, Mr. Wm. H. Chew; New York, Mr. Alec H. Seymour; North Carolina, Dr. Watson S. Rankin; North Dakota, Dr. Gustav A. Ruediger; Ohio, Dr. Frank Warner; Pennsylvania, Dr. Wilmer R. Batt; Rhode Island, Dr. Gardner T. Swarts; South Carolina, Dr. Wm. A. Boyd; Texas, Mr. Robert P. Babcock; Vermont, Dr. Henry D. Holton; Virginia, Dr. Allen W. Freeman; Wisconsin, Dr. C. A. Harper; District of Columbia, Dr. Joseph J. Kinyoun.

CANADA.

Immigration Service, Dr. Peter H. Bryce; Saskatchewan, Dr. Wm. J. McKay; Ontario, Dr. Robert W. Bell; Manitoba, Mr. E. M. Wood.

MEXICO.

Superior Board of Health, Dr. Gregorie Mendizabel; Hidalgo, Dr. Javier Hoyo; Puebla, Dr. Manuel Vergara; Vera Cruz, Dr. Manuel Garcia.

CUBA.

Public Health Service, Dr. Juan Guiteras; Pinar del Rio, Dr. Julio F. Arteaga; Havana, Dr. Federico Torralbas; Matanzas, Dr. Gabriel Custodio; Santiago de Cuba, Dr. Espin.

SECTIONS.

Laboratory, Dr. J. A. Amyot, Vital Statistics, Dr. W. H. Guilfoy; Municipal Health Officer, Dr. F. E. Fronczak.

The Council then organized by the election of Dr. Juan Guiteras as Chairman, and Dr. W. R. Batt, as Secretary.

Upon ballot, the Council nominated the members named below, each for the office stated immediately preceding his name:

For President, Dr. John N. Hurty.

For First Vice President, Dr. Federico Torralbas.

For Second Vice President, Dr. Alexander J. Douglas.

For Third Vice President, Dr. Carlos M. Garcia.

For Treasurer, for two years, Dr. Frank W. Wright.

For Executive Committee, each to serve two years, Dr. Allen W. Freeman, Dr. Joseph J. Kinyoun, and Dr. Joseph H. Townsend.

Invitations to meet in 1912 in each of the places named below were received:

Asheville, North Carolina
Atlantic City, N. J.
Chicago, Illinois
Niagara Falls, N. Y.
Philadelphia, Pa.
Washington, D. C.
Kansas City, Mo.
Rochester, N. Y.
San Francisco, Cal.

Upon ballot, the Council voted to recommend that the invitation of Washington, D. C. be accepted.

The Council by ballot nominated for honorary membership, Senator Robert L. Owen, of Oklahoma, U. S. A.

There being no further business, the Council then adjourned.

Juan Guiteras, Chairman.
Wilmer R. Batt, Secretary.

Dr. Dowling moved that the report of the Advisory Council be adopted. Carried.

Dr. Bryce moved that the Secretary cast the ballot of the Association for the officers named in the report of the Advisory Council and for the place of meeting recommended therein. Carried unanimously.

The Secretary having cast the ballot as directed, the officers named in the report of the Advisory Council were declared elected and the place of meeting duly adopted.

Dr. Bryce moved that it be suggested to the President that he appoint a committee on exhibit, to act on behalf of the Association in connection with the proposed exhibit that is to be held as a part of the International Congress on Hygiene and Demography. Carried.

Dr. Dowling offered the following amendment to the constitution:

"Amend Article IV, by striking out the last sentence of section 4, "The Secretary shall receive an honorarium of $400, annually during his term of office," and the last sentence in section 5, "The Treasurer shall receive an honorarium of $200 annually during his term of office," and insert in lieu thereof respectively, the sentence, "The Secretary shall receive an honorarium plus actual expenses incurred on account of attendance on the annual meeting, said honorarium to be arranged for by the Executive Committee," and the sentence, "The Treasurer shall receive an honorarium, said honorarium to be fixed by the Executive Committee."

Dr. Bryce gave notice of the following amendments to the Constitution. To arrange the committees so that the Committee on Journal and the Committee on Publication will be combined. To provide for the abolition of associate membership, and to make the constitution and by-laws conform to the conditions that will exist if associate membership be abolished.

Under the constitution these amendments and notices of amendments must lie over one year.

Dr. Dowling moved that the Executive Committee be requested to provide for the reimbursement of the Secretary for traveling expenses incident to the Secretary's attendance at the Havana meeting. Carried.

Mr Jordan moved that the Executive Committee be requested to provide for the reimbursement of the Treasurer for expenses incident to the Treasurer's attendance at the Havana meeting. Carried.

The report of the Committee on Necrology was submitted by the Secretary, on behalf of the Chairman of the Committee, Dr. Holton, who was absent.

Dr. Bryce moved that the Secretary of the Association be instructed to send a suitable expression of sympathy to the members of the families of the deceased. Carried.

A letter was received from Mr. Nathan Straus relative to pasteurization of the milk supply as a preventive of disease.

A letter was received from Dr. Liceaga, expressing his regret because of his inability to be present.

Dr. John S. Fulton, Secretary-General, International Congress on Hygiene and Demography, was then given the floor and urged the active support of the Association in the work of the Congress.

Papers were then read as follows:

Methods of sludge disposal, by Mr. Rudolph Hering, New York, N. Y.

Disposal of refuse, by Dr. Eugenio S. Agramonte, Havana, Cuba. Read by title.

House to house inspection, by Dr. Federico Torralbas, Chief of Sanitary Inspection, Havana, Cuba. Read by title.

Sanitary inspection of the Canal Zone, by Dr. A. J. Orenstein Assistant, Chief Sanitary Inspector, Isthmian Canal Zone, Ancon, C. Z. Read by title.

The relation of infant mortality to the cost of living, by Drs. William C. Woodward and John L. Norris, Health Department, Washington, D. C. Discussed by Drs. Dresslar and Warner.

How the Confederate Army was vaccinated, by Dr. C. W. P. Brock, Chief Surgeon, Chesapeake and Ohio Railway, Richmond, Virginia. Read by Dr. Levy, in the absence of Dr. Brock. Discussed by Dr. Wheeler.

History of the adoption on the American Continent of Bertillon's nomenclature, now international, of causes of deaths and diseases, by Dr. Jesus E. Monjaras, Secretary General, Superior Board of Health, Mexico. Read by title.

A few hints on vital statistics, by Dr. Jorge Le Roy, Chief Statistician, Department of Sanitation and Charities, Cuba.

The tuberculosis league of Havana, by Dr. J. N. Jacobson. Read by title.

Ocular hygiene, by Dr. Juan Santos Fernandez. Read by title.

A contribution to the study of beri-beri, by Dr. M. J. Lebredo, Director of Research Laboratory, Havana, Cuba. Read by title.

Hygiene of the new born child by Dr. Arturo Mendez, of San Luis, Potosi, Mexico. Read by title.

Col. Gorgas then moved the adoption of the following resolution:

"Resolved that the members of the American Public Health Association express hereby their appreciation of the courtesies extended to the Association during the session just held at Havana, by the Government of Cuba; the Honorable President of the Republic, José Miguel Gomez; the Honorable Minister of Public Health and Charities, Dr. Manuel Varona Suarez, the Director of Public Health, Dr. Juan Guiteras; and by the Chief of Sanitary Inspection, Dr. Federico Torralbas, together with other members of the official staff of the Department of Public Health and Charities; by Drs. Menocal and Lamar, Officers in charge of Quarantine and Immigration; the municipal authorities and members of the medical profession of Cuba and of Havana, and by the people of Havana generally." Seconded by Dr. Bryce. Unanimously adopted.

The meeting then adjourned.

ROBERT M. SIMPSON,
President.

WM. C. WOODWARD,
Secretary.

MINUTES OF THE FIFTH ANNUAL MEETING OF THE SECTION ON VITAL STATISTICS OF THE AMERICAN PUBLIC HEALTH ASSOCIATION AT ITS THIRTY-NINTH ANNUAL MEETING, HAVANA, CUBA, DECEMBER 5th TO 9th, 1911

Tuesday, December 5, 1911, 2 p. m.

The meeting was called to order by the chairman. In the absence of the Secretary, the Chairman requested that a Secretary pro tem be appointed. Dr. Wilbur nominated David S. South, State Registrar, Trenton, New Jersey. The nomination was seconded by Mr. F. D. Beagle, State Registrar of New York, and Mr. South was declared elected Secretary pro tem.

The minutes of the last regular meeting were read and approved.

The Nominating Committee was named as follows:

Dr. Cressy L. Wilbur, *Chairman.*
Dr. W. S. Rankin
Dr. P. H. Bryce
Mr. F. D. Beagle
Dr. W. H. Davis.

The nominations were closed and the Secretary was ordered to cast the ballot for the election of the Committee above mentioned, which was done, and the said Committee declared elected.

The report of the Committee on Membership, it was decided, should be made later.

The next order of business was the election of a Member of the Advisory Council, and Dr. Wilbur nominated Dr. W. H. Guilfoy. The Secretary was ordered to cast the ballot for Dr. Guilfoy, who was accordingly declared elected.

The next order of business was the Chairman's address, and the Chairman, Dr. Batt, announced that he had prepared no written address but would make such suggestions as in his opinion would improve the methods of statistical practice, especially relating to age divisions in infant mortality. Dr. Batt's remarks were greatly appreciated, and at the conclusion of his address, Dr. Wilbur moved that Dr. Batt be requested to prepare a paper containing the substance of his remarks, and, if possible, amplify the same, and present it to the section at his pleasure.

The next order of business on the program was the "Discussion of Uniform Primary Tables for the Presentation of Weekly Mortality Reports of Municipalities." Dr. Guilfoy opened the discussion by requesting opinions of those present as to the advisability of incorporation in the weekly reports, reading matter of interest pertaining to the public health, such as is issued by the Boards of Health in the cities of Buffalo and Chicago.

The discussion was also taken up by Drs. Bryce, Holton, Swartz, Townsend, Rankin, Wilbur, and Mr. Beagle and Mr. South.

Dr. Wilbur remarked that, in his opinion, the publication of a Weekly Bulletin should be encouraged, and that they should have at least two important subjects each week for presentation, and suggested that the statistical part of the Bulletin, and also the portion relating to Health Administration, be given careful attention.

Dr. Batt suggested that in his opinion every municipality should be encouraged to publish a regular bulletin.

Dr. Bryce moved that this section transmit a bulletin report with the request that the Statistical Committee draw up a weekly report for municipalities, based upon the various reports in existence, with the suggestion that these statistics form the basis of notes, to be distributed for the information and education of matters relating to public health, and that the Committee be instructed to bring this form of report before the state and municipal authorities for adoption. Carried.

The next question taken up was the discussion of "Uniform Primary Tables for the Presentation of Monthly Reports of Municipalities," and, in this connection, Dr. Wilbur submitted, as forms, the Bulletins published by the Board of Health of the state of New York, and also the states of Connecticut and Michigan, as forms for monthly reports of states. These forms were also referred to the same committee, covered by the motion made by Dr. Bryce in reference to the previous tables.

Dr. LeRoy, of Havana, was next introduced to the section, and invited the members present to visit the exhibit prepared by him in the Lobby of the Hotel Sevilla. Dr. LeRoy was thanked for his kind invitation, and Dr. Wilbur moved that the bulletin published by Dr. LeRoy be included in the ones referred to above. Dr. Batt, the chairman of the section, also thanked Dr. LeRoy for the special attention he had given in preparing an exhibit on Vital Statistics.

Dr. Rankin of North Carolina called attention to a chart published by his department, and agreed to submit a copy of the same at the next annual meeting. Dr. Rankin then moved that a committee be appointed to report on tables on Infantile Mortality at the next annual meeting.

The meeting then adjourned to meet at two o'clock the following day.

Wednesday, December 6, 1911.

The meeting of the section on Vital Statistics was called to order by Dr. Batt. The report of the Committee on Infantile Mortality Tables was received, and after discussion was adopted and recommended to municipalities and states for their adoption.

On motion of Dr. Batt a vote of thanks was extended to Dr. Coleman for supplying the members of the section with copies of the Bellevue Hospital Nomenclature of Diseases, and the secretary instructed to notify Dr. Coleman of this action.

The nominating committee suggested the following officers for the ensuing year:

REPORT OF NOMINATING COMMITTEE

For—

Chairman—Dr. Wilmer R. Batt
Vice Chairman—Dr. Jorge LeRoy
Secretary—Mr. David S. South

Advisory Council

Dr. P. H. Bryce
Dr. W. F. Snow
Dr. W. H. Guilfoy
Dr. M. V. Heckard
Dr. Mendizabal
Dr. Cressy L. Wilbur as Honorary Member

Committee on Membership

Dr. William H. Guilfoy

Committee on Program

Dr. Wilmer R. Batt

Committee on Publication

Dr. Henry D. Holtan

Committee on Legislation

Dr. C. V. Chapin
Dr. W. C. Woodward
Dr. W. R. Batt

Committee on Forms and Methods of Statistical Practice

Mr. David S. South
Dr. W. F. Snow
Dr. F. L. Hiller (Mo.)

Committee on Forms of Statistical Tables

Dr. W. H. Davis (Boston)
Dr. A. G. Young
Prof. W. F. Willcox

Committee on Occupations

Mr. Frederick L. Hoffman

It is recommended that the regular procedure of the section, as provided in the constitution, be strictly carried out during the ensuing year as a test of the pratical working of the methods proposed, and that chairmen and members of committees co-operate therein.

Respectfully submitted,

CRESSY L. WILBUR, *Chairman.*

Dr. Batt was re-elected as Chairman, accepted the office with well chosen remarks, and assured the members of the section of his continued loyalty to the cause of Vital Statistics, and suggested that in future efforts be made to hold the meeting of the Section on Vital Statistics at such time when other sections of the organization were not in session. Dr. Batt thought that in this manner a much larger attendance would be had.

Dr. Bryce then moved that Dr. Batt consult with the chairmen of other sections as to the arrangement of the program as suggested.

Dr. Batt brought before the section the report of Mr. Crocker of Williamsport, Pa., for consideration as to the advisability of co-operating in securing improved marriage and divorce laws. Dr. Wilbur moved that the matter be referred to the Committee on Statistical Practise and the Committee on Legislation for report next year. Adopted.

Dr. Wilbur suggested that the standard marriage blank be adopted.

Dr. Rankin then discussed the possibility of securing complete mortality registration in the South, and in this discussion Dr. Rankin gave his personal experience in securing co-operation of officials, and cultivating public opinion in regard to the Registration of Vital Statistics. The discussion was also continued by Dr. Bryce, Dr. Dowling, Dr. Wilbur and Mr. Babcock. At the conclusion of the discussion Dr. Batt commented upon the excellent manner in which Dr. Rankin gave his experience and requested that Dr. Rankin prepare in writing the substance of his remarks to be made a part of the transactions of this section. Dr. Rankin agreed to prepare such a paper.

It was next decided to take up the program arranged for Saturday morning, and the question as to the discussion of Uniform Methods in the Registration and Classification of Still-Births, was presented by Dr. Batt. Most of the registrars present gave their experience and suggestions as to proposed rules of statistical practise in this respect, and at the end of the discussion a proposed rule was suggested as follows:

Proposed Rule.
Still-Births.

Rule No. —— It is desirable that still-births shall be registered at all periods of uterogestation, but for statistical comparisons two divisions may be made:

(a) Still-births over the period of viability, (5 months).

(b) Still-births under the period of viability.

It was then moved by Dr. Wilbur that this question be laid over for another year, and if possible, the Committee on Forms and Methods of Statistical Practise report in reference to this matter at the next meeting. Adopted.

The following resolution was offered by Dr. Batt:

Resolved, that it is the sense of the American Public Health Association that all reports of communicable diseases, other morbidity, accidents, occupational diseases and mortality, primarily dependent upon statements of physicians, should be made returnable to the State Health Departments charged with the general duty of collecting and compiling the Vital Statistics of each state.

This resolution was also adopted.

The meeting then adjourned to convene at the call of the chair.

WILMER R. BATT,
Chairman.
DAVID S. SOUTH,
Secretary.

BOOK REVIEWS

Report of the Commission on Milk Standards Appointed by the New York Milk Committee. *Public Health Reports, Vol. XXVII, No. 19, May 10, 1912. pp. 673–700.*

The report of the Commission on Milk Standards, appointed by the New York Milk Committee, marks a distinct advance in the movement for improved milk supplies, and in the matter of rules and regulations dealing with this subject is likely to bring system out of chaos, which will be advantageous to producer, dealer and consumer. The committee has done well to point out that this betterment involves an economic problem, as it is one incapable of satisfactory solution without appreciation and financial support from the consumer. The plea for legislation, wherever needful, clothing local boards of health with more power, and for substantial financial support of administrative departments in charge of the hygienic control of milk supplies, directs attention to two existing drawbacks to successful results under the usual prevailing conditions.

Uniformity in pasteurization methods is a desideratum which has been treated in a commendable manner.

In the matter of stating bacterial counts, the committee, by recommending the use of a figure known as the "bacterial content," has attempted a solution of a problem which has proven vexatious to health officials. This suggestion has the advantage of simplicity and uniformity, and when adopted will render the results from laboratories employing this system readily comparable. The plan for rating a city's entire milk supply is worthy of general adoption. Concerning the enforcement of bacterial standards, there is no suggestion as to what the committee deemed the preferable method, although under the heading of "publicity" there is a general recommendation that the reports of laboratory analyses of milk made by departments of health be regularly published. This feature of publicity is a most effective agency, and where employed has proven a potent factor in directing the attention of consumers to the commendable milk supplies. The committee believes that to warrant publication of results there should be at least four consecutive bacteria counts of separate samples within a period of not more than four weeks.

Relative to the chemical standards proposed, it would appear that manipulation of milk has been invited by the advocacy of the factors 3.25 per cent. fat and 8.5 per cent. solids not fat. Such standards in actual practice will mean that until all men are honest, richer milk will in many instances be subject to removal of cream, or be combined with skimmed milk or judiciously watered, to reduce it, as far as safety will permit, to the standards mentioned above. The standard for cream has been placed at 18 per cent. milk fat, and it should be "free from all constituents foreign to milk." The present use of unsweetened condensed milk in cream as a deceptive agent appears not to have been considered by the committee, or, if so, no suggestion is made as to the necessity for checking this admixture. Furthermore there is no recognition of the fact that the greatest fraud in the traffic in this commodity is in the sale of the so-called "heavy" cream, and concerning which the proposition might well have been advanced that cream containing more than 18 per cent. milk fat should be sold upon a guaranteed fat basis. The committee believes, however, in the sale of milk under a "guaranty system."

The term buttermilk has been restricted to the product which remains after the churning of butter. There appears to be no more reason for prohibiting the use of this name to the product made from milk or skimmed milk with a "starter," than that the term butter should only be applied to the variable substance made from cream under old methods, and should not be given to butter when prepared from cream scientifically ripened. The committee proposes that milk or skimmed milk soured so as to resemble buttermilk should be known by some distinctive name.

The commission passed a resolution presented by a special committee, by which milk changed by the addition or subtraction of cream should be labeled "adjusted milk." A revolution in the milk business would result if skimmed milk could be distributed as "adjusted milk." In another portion of the report, however, it is stated that milk from which the cream has been abstracted should be conspicuously labeled "skim milk," containers should be painted a distinctive color, and a tag bearing the words "skim milk" should be attached to the buyer's container. "Substandard milk" is a term proposed for natural milk containing less than 3.25 per cent. but more than 2.5 per cent. milk fat, provided the percentage of fat does not fall below a definite percentage that is stated in a conspicuous manner on the container. A label worded "milk below standard" would undoubtedly convey more meaning to many consumers than that suggested by the committee.

The commission has classified milk into four grades; namely, Class A—Certified milk or its equivalent; Class B—Inspected milk; Class C—Pasteurized milk; and Class D—Milk not suitable for drinking purposes. The wisdom of the recognition of this "Class D" milk is a debatable issue, and it is certain that it will be used contrary to the ideas of the committee, despite the proposition to have it delivered in a distinctive container. Milk is milk and will continue to be to a majority of consumers for many future years, despite this safeguarding plan proposed. Milk under this classification is that containing over 1,000,000 bacteria per cubic centimeter, or from farms scoring less than 40 per cent., which has been pasteurized or heated to a higher temperature before being offered for sale.

The proposition to label milk with the grade in which it is to be sold is excellent, provided it can be accomplished through the medium of caps, so as not to influence the price of this commodity. Labeling, however, "with the date of delivery to the consumer" does not possess the merit of common sense.

In the adoption of rules for the production, handling, and distribution of milk, wisdom has been shown in the division into groups of requirements which should be enforced, and into recommendations for adoption "wherever practicable as a means of improving the milk supply above the actual point of safety." Without discussing these in detail, it may be stated that the proposed requirement that "no milk from a dairy which scores below 70" on the score card of the United States Bureau of Animal Industry, "shall be sold" as raw milk is a standard attainable for only a minority of dairies supplying many cities and towns with milk at this time. The product from farms scoring less than 70 and not below 40 is to be sold after being heated, as pasteurized milk.

The work of this committee will wield a powerful influence in bettering the milk supplies of the future and its members are to be commended for this able report, and the celerity with which their task was brought to its present high standard.

James O. Jordan.

The Influence of Caffein on Mental and Motor Efficiency. *By Dr. H. L. Hollingsworth. Archives of Psychology, No. 22, April,* 1912.

Caffein is the alkaloid present in tea and in coffee. It is an active drug and, in large doses, a poison. A recent government bulletin (U. S. Department of Agriculture, Bureau of Chemistry, No. 148, Salant and Rieger) gives information in regard to the quantities which are toxic and those which are lethal for various animals. But the usual employment of caffein-containing beverages is based on the popular belief that they are stimulating and scarcely harmful. The amounts of the pure compound used by Doctor Hollingsworth are comparable with the quantities taken by habitual drinkers of tea and coffee from day to day. The largest single dose administered (6 grains) is not much more than the caffein content of two large cups of coffee.

Earlier trials have been rather numerous but they now appear to have been faulty in matters of detail and the present research is certainly unparalleled in the number of experiments included and the scrupulous attention paid to possible sources of error. Sixteen subjects, ten men and six women, were engaged under formal contracts to give their time conscientiously to the tests during 40 days. The director had the coöperation of a staff of six assistants. The data secured are impressive in bulk and have been classified and discussed with a conservative spirit and admirable clearness.

In all such studies the necessity of excluding all influences due to suggestion is well recognized. In the present instance the subjects never knew when they were receiving the caffein. They were given from time to time pills, capsules, and glasses of soda-water, most of which were blank but some of which contained the alkaloid in recorded amounts. There was a preliminary control period of several days during which no caffein was given but the routine of life became established and the succession of tests ceased to be novel.

The attempt was made to ascertain first of all the effect of caffein upon the ability to make dots at the highest speed. This is a measure of neuro-muscular facility in a simple and not skillful act. With all doses there was a gain in rapidity demonstrable during a period of two to four hours. The greatest degree of this stimulation was not over 8%. There was no sign of a compensatory fall below the initial ability as the effect of the drug wore off.

In another series of experiments the subject was required to insert a rod into one after another of three sockets as rapidly as possible. This tests accuracy of aim and refinement of coördination as well as sheer speed. Here again the results showed a certain gain in efficiency excepting with large doses which caused some unsteadiness.

The effect made itself felt after about an hour and was noticeable for as long as four hours. Once more there was no evidence of a damaging reaction.

Passing on to tests of more strictly mental activities the investigators recorded (1) the time required to name 100 colored squares in a changeable order, (2) the time taken in giving the adjectives of meanings opposite to those of 50 read to the subject, and (3) the time needed to add 17 to each of a long series of numbers. In all cases caffein was found to facilitate prompt and correct responses. Instead of being followed by any retardation of the mental processes involved the period of stimulation seemed to influence favorably the performance on the next day. Observations on the power to discriminate between colors at short notice and on the ability to recognize and strike out certain digits in a page of numbers gave no striking results.

An ingenious test of the power to hold a rod within a metal ring without touching it showed that caffein is distinctly unfavorable to the greatest steadiness, a conclusion which many a coffee drinker can confirm. Head-ache, irritability, and sleeplessness were reported by some subjects but were not so closely correlated with former abstinence nor with the absolute dosage as might have been anticipated. The statement is made that the persons of lighter build were more unpleasantly affected than their heavier associates and it is assumed that this simply means that the lighter individuals received relatively stronger doses. May it not well be that the heavy build is a sign of an organization not easily stimulated to heightened metabolism by any such agent?

In general it appeared that the invigorating effects of caffein were more marked when initial fatigue was present than when the subject was well rested. This is as we should expect. The stimulation was delayed and perhaps somewhat diminished when the alkaloid was taken at meal-time. The absence of a phase of depression after the positive effect seems to be the most remarkable fact demonstrated. It is properly claimed, so far as the experimental findings are concerned, that the regular use of tea and coffee is distinctly supported. The difference between these beverages and alcoholic liquors is emphasized afresh. Caffein and alcohol have this in common: that they both abate the sensation of fatigue. Both give the user a feeling of ease and facility. But with caffein this feeling is the accompaniment of a truly enhanced capacity for work while with alcohol it has often been shown to be a subjective illusion.

Reference to the most practical of Doctor Hollingsworth's tests has been deferred to the last. A subject was employed for short periods in copying literary extracts on the typewriter. Caffein was found to exert little influence on the speed maintained but a very favorable one upon the correctness of the copy. This stands in sharp contrast with many data regarding alcohol.

The sixteen persons who submitted to the trials included only three who declared themselves to be abstainers from tea and coffee. These three did not react in markedly different fashion from the habitués though one of them (a woman, No. 11) was probably the most susceptible to the compound of any of the company. We should not be warranted on the ground of these results in concluding that every individual can drink coffee with lasting advantage but it must be admitted that the facts so carefully gathered are unexpectedly favorable to the "cup that cheers."

Percy G. Stiles.

Practical Method of Sewage Disposal. *By Ogden and Cleveland, New York. John Wiley & Sons,* 1912, 8*vo.* 132 *pages,* 52 *figures,* $1.50 (6/6) *net.*

This book treats entirely of methods of sewage disposal for residences, hotels and institutions. These methods are adaptations of the well-known principles of the septic tank, sub-surface irrigation, sand filtration and broad irrigation to plants of small size. No new principles are developed and the various chapters are concerned chiefly with details of construction.

To engineers familiar with the author's previous books on sewer design and sewer construction, this book will be regarded as merely a supplement, but to the general reader not familiar with the subject, it will prove of interest. It is not, however, a sufficient guide for a layman intending to build works, and in some respects it may prove disappointing to him. For example the chapter on Estimates of Costs, describes methods of estimating but gives no idea of what an actual plant is likely to cost. Nothing is said in regard to the operation of plants after construction, and this is one of the most important features of the subject, and one almost universally ignored by the owner. The author assumes that cesspools are not to be recognized as a proper method of sewage disposal, yet many competent sanitarians believe that under proper conditions and with proper care, they furnish a method of disposal quite as satisfactory as a more elaborate plant that is not well taken care of.

G. C. Whipple.

Annuaire-Statistique International. Des Installations D'Épuration D'Eaux D'Égouts, to the first of July, 1911. *With the laws and regulations in force on the subject of drainage in most countries. By B. Bezault, Sanitary Engineer. Quarto,* 172 *pp., illustrated by* 20 *photographs and* 2 *statistical diagrams. Masson et Cie, Éditeurs, Paris,* 1912.

In the introduction to this statistical volume the author states that the first septic tank and contact beds in France were installed near Dieppe in 1899. Some years after an experimental plant was constructed near the sewage farm at Achères. Since 1901 experiments have been made with the sewage of Paris, but the progress has been very slow, notwithstanding the information at the hands of competent authorities. There is considerable opposition to sanitary progress and to hygienic improvement, even among the physicians. The author compares progress in France to that in other countries, expecially in Teutonic and Anglo Saxon lands. In conclusion to the introduction he expresses the hope that France will join in the progress which the rest of the world is making.

The book contains statistics concerning almost 3,000 installations gathered from all the principal countries of the world. Besides, there is a brief description of the various well-known methods of disposal. The subjects are taken up by countries, and under each heading is an abstract of the sanitary laws of the country and statistics regarding the general mortality and that due to typhoid fever and tuberculosis. Following this is a statistical summary, arranged geographically, and well illustrated with photographs of some of the newer plants. The European statistics are much more complete than those of the United States, although there are good reviews of the laws of Massachusetts, New Jersey, New York, Ohio and Pennsylvania, photographs of parts of the Columbus and Baltimore plants and fragmentary data regarding twenty-five or more cities. The American statistics are supposed to cover the years 1907 to 1910, but strangely they omit many important plants constructed during that time.

The book would serve as a very good guide book of the European sewage disposal plants.

Two statistical diagrams apparently show that the mortality is in inverse ratio to the degree of development of sewage disposal, and in direct ratio to the use of primitive methods of disposal. There is no mention, however, of the fact that the state of civilization which is responsible for sewers may also have had some effect upon other conditions equally important as effecting the mortality. *R. S. Weston.*

Baby's Teeth to the Twelfth Year. *By Albert Westlake, D.D.S. New York and London. Mitchell Kennerley,* 1912. *Cloth, 50 cents net.*

Recent developements in the study of oral and dental hygiene lend particular interest to a little booklet issued by Mitchell Kennerley (New York) from the pen of Albert Westlake, D.D.S., a well-known dentist of New York City. The title of Dr. Westlake's book is "Baby's Teeth to the Twelfth Year." He emphasizes the fact that the care of the teeth in babyhood and in early childhood demands unusual watchfulness on the part of the parents, particularly the mother. The interest and care of the mother for the teeth of her child begins long before the birth of the child and should extend at least until the child is twelve years old, when presumably good habits with regard to the personal cleansing and care of the teeth will have been established. Good teeth are the product of good wholesome bodies and in order to secure good teeth, proper attention must be paid to diet and exercise and general health.

Teachers in public schools, mothers, and other persons will find Dr. Westlake's booklet of unusual interest.

Philip P. Jacobs.

HEALTH DEPARTMENT NOTES

Richmond, Va.

It is always with pleasant anticipations that the Annual Report of the Health Department, City of Richmond, Virginia, is opened, and the last issue for 1911 is no disappointment. Dr. Levy, the able health officer, always has something interesting to say and his sixth annual report is a volume which repays careful perusal. This is one of the annual reports which should be read by all students of sanitary science, as it not only gives a clear account of the health status of the city but contains much of general interest and importance.

The Health officer after pointing out the fallacy of considering too closely the crude death rate of any city as an index to its healthfulness particularly for the purpose of comparing communities with different kinds of population, reports that the death rate for Richmond for 1911 showed a decrease of 1.55 per 1000 over 1910. There were actually 169 less deaths. After non-resident deaths were excluded the rate was 18.96. Decreases in the number of deaths from typhoid fever, measles, pneumonia and other diseases of the respiratory system, and consumption largely produced the diminution in the total. There were increases in the death rates from dysentery, diarrhea (under two years) and suicides.

The remarkable typhoid fever record was again bettered, there being only 23 deaths from this disease giving a rate per 10,000 of 17.8. While the department is worthy of praise for much good work in many lines, yet the typhoid fever record impresses one so strongly that it is difficult to pass it by without enthusiastic mention. The average rate for the past three years has been less than half of the lowest rate ever recorded before. As in the 1910 report a brief history is given of all fatal cases. At least 8 such cases were contracted outside of the city and the diagnosis was distinctly doubtful.

The diphtheria record for 1911 was also very satisfactory. One point that is especially emphasized by Dr. Levy is the work done by Dr. Lipscomb, the consultant of the department on this disease. He has been wonderfully successful with the cases that he has intubated during the past 5 years. Dr. Levy after reviewing the statistics of cases intubated states that he does not know of a diphtheria hospital, with all its advantages which can show as good results as Dr. Lipscomb obtained treating the cases at home.

One of the most interesting parts of the report deals with comparative mortality of the white and colored races. The following extracts from the report are of sufficient general interest to warrant reprinting.

"As is always the case, the crude death rate of Richmond was enormously increased in 1911 by reason of the large colored population and their high death rate. The rates for both the white and the colored population were much lower in 1911 than in 1910. Of the 129,291 inhabitants estimated by the United States Bureau of the Census as constituting the 1911 midyear population of Richmond, 85,565 were white and 47,726 were colored. The colored population thus made up 37 per cent. of the total population. The number of colored inhabitants is 59 per cent. of the white.

"With non-residents of both races included, the total number of deaths in Richmond during 1911 was 2,718, of which 1,377 were white and 1,341 were colored. The colored race, with only 59 per cent. as many inhabitants as the white, had 97 per cent. as many deaths. A fairer comparison, however, is one in which non-residents among both races are excluded. Among the inhabitants of Richmond there were 2,451 deaths in 1911, of which 1,192 were white and 1,259 were colored, the number of colored decedents thus exceeding the white. Having only 59 per cent. as many representatives as the white race, the number of deaths was 6 per cent. greater. These figures are almost identical with those for 1910.

"Stated in terms of relative death rates, thereby taking into account in the one figure both the population and the number of deaths the colored death rate per 1,000 was 66 per cent. higher than the white, with non-resident decedents of both races included, and 80 per cent. higher with non-residents excluded.

"As is also usual in Richmond, the number of deaths among the colored race exceeded the number of reported births. It is recognized that the Richmond birth returns for neither race are complete and that the percentage of unreported colored births is probably greater than the percentage of white. During 1911 there were 460 more births than deaths among the white race, with deaths among non-residents included, and 645 more with deaths among non-residents excluded. Among the colored race, on the other hand, the number of reported births was 238 less than the number of deaths, with deaths among non-residents included, and 156 less not including deaths among non-residents.

"Comparing the relation between the birth rate and death rate of the white and colored races, the reported birth rate among the whites exceeds the death rate, non-residents included, by 5.64 per 1,000 inhabitants, and by 7.91 with non-resident decedents excluded. The reported birth rate among the colored race falls short of the death rate, non-residents included, by 4.99 per 1,000, and by 3.27 with non-resident decedents excluded.

"On their face these figures would unquestionably show that the colored race is actually dying out in Richmond, just as they have shown the same thing year after year. The incompleteness of the birth returns must, however, be remembered. Even allowing that this is a far more important factor with the colored race than with the white, the difference between an excess of 645 for the white race and a deficit of 156 for the colored is so great that it must be certain that the colored race is at least increasing far less rapidly than the white.

"It has been customary to believe that the fecundity of the colored race is prodigiously great, far more than sufficient to offset their very high death rate. But the reported birth rate in Richmond in 1911 was only 59 per 1,000 higher for the colored race than for the white, while the death rate was 11.22 per 1,000 higher. Even allowing for considerably less complete returns of colored births than of white, their birth rate is certainly not significantly higher than the white race, while their death rate is enormously higher. . . .

"Everywhere we hear discussions of the 'negro problem.' If the present death rate continues there will be no negro problem after a few decades, as the race will have become so insignificant in numbers as to be eliminated as a factor in our national life.

"Well wishers of the negro race, especially northerners possessing more money and goodness of heart than understanding of the negro and his need, spend annually hundreds of thousands of dollars on education of the negro along lines of questionable value. Individuals who are filled with a desire to devote a portion of their great wealth to the benefit of humanity are noted for the paucity of imagination in the methods which they select. It seems incredible that such large sums should be spent annually for educating the negro while not one cent has been devoted to studying the most vital question above discussed. In my first annual report (1906) I directed attention to the above facts and suggested that no higher service could be rendered the negro race than the devotion of a comparatively insignificant sum to the investigation of the underlying causes of his high death rate."

Lack of space prohibits referring to the admirable work done in the sanitary improvement of the milk supply, the prevention of infant mortality and tuberculosis. As already stated this report should be carefully studied by health officers and students of sanitary science.

Montclair, New Jersey.

The most interesting feature of the annual report of the Board of Health of Montclair, N. J., is undoubtedly the discussion concerning the famous *Board of Health of Montclair* v. *Borden's Condensed Milk Company* case. It will be recalled that this large milk company contested the authority of the Health Department to pass an ordinance demanding that all milk sold in Montclair must be from cows free from tuberculosis, as proved by the tuberculin test, with the possible alternative of pasteurization by methods approved by the Board. After contesting this requirement between three or four years and causing the Board to spend nearly $7,000 in cash for litigation, besides much valuable time and energy on the part of the Health Officer, which was needed for other health protective work, the contestant withdrew its appeal to the State Court of Errors and Appeals and also its suit in the United States Court, and began giving its customers the choice between milk from tuberculin tested cows and milk which had been pasteurized. "By this action" the report states, "the Borden Company has given fair promise and every reasonable assurance that it will again become what it has been for so many years before the unfortunate litigation, one of the strongest allies of the Board in its efforts to give Montclair a milk supply, every quart of which is as safe for consumption by infant or adult, as milk can possibly be made without a marked increase in cost."

The President of the Board of Health, Mr. M. N. Baker, outlines in the report a classification of Health Board Expenditures. The scheme which appears to him to be the logical one, is functional in character, and its three main heads and the leading divisions under those heads are as follows:

I. Direct Health-Protective Work.
  (1) Prevention and Control of Communicable Diseases.
  (2) Reduction of Infant Mortality.
  (3) General Health-Building and Maintenance.

II. Indirect or Remote Health-Protective Work.
  (1) Municipal Cleansing.
  (2) Private Cleansing.

III. General (so far as not distributable under I and II.)
  (1) Records.
  (2) Research.
  (3) Publicity, etc.

Mr. Baker expresses the hope that during 1912 those who are interested in rational and comparable health board statistics will come to a general agreement of a workable classification schedule. Health Officer, Chester H. Wells' report is as usual a well prepared and careful piece of work. Some of the more important facts in the report are:

1. The death rate of the town was the lowest with only two exceptions since 1885, being 10.29 per thousand. (Corrected for the deaths of non-residents).

2. The death rate from communicable diseases was very low. There was one death each from typhoid fever, diphtheria and measles. There were six from whooping cough and none from scarlet fever. Tuberculosis of the lungs caused 21 deaths, compared with 30 during the previous year.

3. The infant mortality of the town was never so low as during the past year. There were 79 deaths per thousand births.

Two thousand dollars has been appropriated for anti-mosquito work in 1912, and Mr. Wells states that if the householders cooperate with the Board, there should be no mosquito nuisance in Montclair during 1912 that can be traced to local breeding.

This is an admirable report and does credit not only to the Board of Health and to the Health Officer and his associates, but to the citizens of Montclair who evidently realize the great importance of efficient public health service and are willing to pay for the same.

Orange, New Jersey.

Orange is contiguous territory to Montclair but there are considerable differences in population, employment, etc., of its people. The population of Orange is 30,505 and of Montclair 22,833. Orange is largely industrial while Montclair is more residential. Mr. McNutt, the Health Officer, has been very active and has brought about the establishment during the year of a well equipped Laboratory for chemical and bacteriological work. A large number of new ordinances have been passed. In view of the general need of more stringent local control of rabies, a new ordinance was passed, which, it is stated, represents about the limit of the power of local Boards under the present State laws.

Much progress has been made in the supervision of the milk supply although it is pointed out that more assistance is needed in this work, and the proposal of a joint milk inspection for the various Orange municipalities is heartily endorsed by the Health Officer. The corrected death rate in the city was 14.59 per thousand, and with the exception of one year, is the lowest on record. The most striking phenomenon in the vital statistics of 1911 is the marked fall in the death rate from tuberculosis. The death rate was 183 per hundred thousand as against 229 the previous year.

The infant mortality record was not as satisfactory as in previous years. This is attributed to the great heat of July and August. It is important to point out that the special visiting nurse for infant work, who was appointed in June, gave instructions to 213 mothers who had just given birth and made 1,120 visits to these mothers and children. Of the cases visited only 2 died of preventable cause. This work is being continued and augurs well for its continued success.

This report is one of the very few to give tables showing infant and child mortality not only by causes but by age periods,—days for the first week of life, weeks for the first month, months for the first year and years for the first five years.

It would be very valuable if others, particularly larger cities, would give their infant mortality statistics in a similar manner.

Secretaries of State Boards of Health, Health Officers and others are urged to send copies of their annual reports and other publications to the Managing Editor, American Journal of Public Health, 755 Boylston Street, Boston, Mass., for notice in these columns.

PUBLIC HEALTH NOTES

The Spread of Acute Intestinal Infections.

In discussing the factors at work in this matter, Dr. H. W. Hill, of the Minnesota State Board of Health, emphasizes again the importance to be attached to the patient himself rather than to general environmental influences. The source of acute intestinal infections is the infected person, and the routes of transfer are simply those from the infected intestines to the victim's mouth. In controlling these diseases, Dr. Hill, states that the modern problems of administrative public health may be divided into:

"(a) Finding and controlling the sources, i. e., the infected persons, whether these be frank cases, mild or atypical cases or well persons.

"(b) Finding and controlling the routes of spread from these persons.

"(c) Supervision of the ordinary routes of transmission of the ordinary body discharges."

Again, the spread of infection may be local—when the infection is transported directly from the intestines, or geographical—when the infected intestine is itself transported.

Dr. Hill closes with the simile of the lock and the key.

"In all infectious intestinal diseases, as in all infectious diseases of every kind, the infectious person is the key to the situation; the sociological condition of the community into which he enters is the lock. The spread of infection is merely an index of how well the key fits the lock. Public health officers must study both, to prevent any fitting of the key with any part of the lock; that is, to prevent the infectious discharges of the infected person from connection at any point with the receptive channels in the community, through which the infection may act."

The Public Health Journal, April, 1912.

Health Conditions in France.

In an article on present health conditions in France, the *New York Times* for June 2nd quotes from the recent annual report of the Academy of Medicine's Commission to the Ministry of the Interior on recent epidemics in France, as follows: "The organization of hygiene in France is merely a vast facade behind which there is nothing."

According to the articles in the *Times*, the report declares, among other accusations of negligence, that in the past ten years the legal regulations regarding hygiene and public health have hardly been applied at all, in respect either to reporting of contagious diseases or to disinfection.

Dr. Mirman, the Director of Public Hygiene at the Ministry of the Interior, fully endorses the commission's report. He states, however, that he finds himself isolated and helpless in a struggle against the inertia and ill-will of the public. Whatever progress he has been able to achieve, he says, is at the cost of prayers, concessions, and even threats.

"The law as to hygiene," he continues, "has made no impression on the Nation and remains a dead letter, while even municipalities and General Councils refuse the necessary funds for the purpose because it is of no value in an electoral campaign."

Dr. Roux, Director of the Pasteur Institute and President of the Superior Board of Public Hygiene, says:

"It is hardly exaggerating to say that health precautions do not exist in France. While legal provisions are hopelessly inadequate, no passing of new acts will bring about better conditions until the nation at large drops its present attitude of stubborn resistance to regulations and advice on the subject."

Prof. Metchnikoff declares that the French public contempt for any measures for the preservation of health and the prevention of contagious diseases is "absolutely amazing." As a case in point he quotes the experience of a colleague whose work consisted in diagnosing patients suspected of having contracted the worst contagious disease known. He made it a practice to ask these patients if they took steps to prevent persons living with them from being infected. In no case had he received an affirmative reply.

"It is the general opinion" says the *Times* correspondent, "that three causes contribute to retard progress in this direction: The absence of any sort of unity of action among the different services of the administration, the hopeless insufficiency of the State's share in the expenses of public hygiene, and the absence of any department with a system of inspection to keep the authorities on the move.

Breast Feeding and Infant Mortality.

The correlation between adequate feeding of the mother and the weight of the nursing infant brought out in the note below from the Medical Officer of April 27th has a significance for those interested in campaigns directed against infant mortality.

"For some years past the Birmingham Corporation, on the advice of Dr. Robertson, the medical officer of health, has paid special attention to measures having for their object the reduction of infant mortality, which in some parts of the city is exceptionally high. In a recent report on the work done by Dr. Jessie Duncan in one of the most squalid districts of the city, an interesting account is given of inquiries which were made as to whether certain conditions in the infant were due to poor quality or insufficiency of breast milk in the case of those infants whose mothers were below the poverty line. Samples of milk were obtained to the number of 136 from 15 nursing mothers in a poor class district. Each sample represented part of the whole content of the breast which had not been emptied for some hours, and the samples were submitted for analysis to the city analyst. The solids-not-fats in the specimens examined were very constant, in amount the average being 8.4 per cent., while the variation in amount was from 7.7 per cent. as a minimum to 9.3 per cent. as a maximum. There was nothing to show that the milk of the robust women was better than that of the weakly women, and the age of the mother or the number of children she had had made apparently no appreciable difference in the composition of the milk.

All the samples were taken from women who were in a more or less poverty-stricken condition, but who were receiving one substantial meal during five days a week. On these five days the percentage of fat in nearly all cases increased, and it diminished when the meals were discontinued. While the mothers were being fed the baby's weight curve also improved coincidently with the increase in the fat of the milk. These observations of Dr. Jessie Duncan (which are, we believe, the first of the kind to be recorded) are of considerable interest, and justify the advice which is being increasingly given by medical officers of health that the children should be attacked through the mothers."

Temperature and the Typhoid Bacillus.

"The effect of temperature upon the vitality of the typhoid bacillus in raw Thames River water formed the subject of part of the seventh research report, recently issued by Dr. A. C. Houston, director of water examination to the Metropolitan Water Board, London. In all previous experiments the temperatures, being those of the laboratory had been considerably higher than those of the outside air. It was accordingly considered desirable that trials should be made so as to embrace a wide range of temperature. Six stoppered bottles, each containing 150 cu. cm. of raw Thames water, were severally inoculated with 1 cu. cm. of typhoid emulsion, and the bottles, which were about three parts full, were stored in the dark in ice chambers or incubators, according to the temperature desired, which accurately registered and maintained the following temperatures in degrees Fahrenheit: 32, 41, 50, 64.4, 80.6, and 98.6.

"At weekly intervals, after shaking so as to include the sediment, the contents of the bottles were examined. At the end of the first week positive results were obtained in all the samples. At the end of the second week, a negative result was obtained with the mixture kept at 98.6° Fahr., the highest temperature. At the end of the third week there was a negative result with the mixture kept at 80.6.° The end of the fourth week showed a negative result with a temperature of 64.4° and the end of the fifth week, with a temperature of 50°. Seven weeks elapsed before all the bacilli in the mixture kept at 41° were dead, and nine weeks were required to entirely exterminate all the microbes in the mixture kept at the freezing point.

"For seven months in the year the average outside water temperature is higher than 50.° At this temperature there were no bacilli alive at the end of the fifth week, while at the end of the third only an average of three per cubic centimeter persisted, the average initial number being 103,328 in the same volume. During the remaining five months of the year the average water temperature is about 41°, a temperature at which, although it is said to be decidedly less favorable to the rapid death-rate of the typhoid bacillus, still reduced, on the average, the initial number in four weeks from 103,328 to 3, the worst result showing a reduction from 23,333 to 12 in this time.

"The typhoid bacilli used in this experiment were cultivated, and hence more persistent, Dr. Houston states, than uncultivated bacilli would have been, and by the second week even at the temperature of freezing water the reduction was over 99 per cent. on the average. The conclusion is that, although there is all this reduction at the end of the second week, it is specially desirable that the water should be adequately stored antecedent to filtration during the five cold months of the year."

Eng. Record, Vol. 65, No. 22, June 1, 1912.

Babies' Welfare Association.

Social workers of New York City have adopted a new system of conducting their baby saving campaign. The Association of Infants' Milk Stations, organized last summer, which did such effective work in eliminating duplication of effort, has just been re-organized on border lines under the name of The Babies' Welfare Association. It seeks to include in a permanent body all the agencies in the city directly or indirectly interested in infant welfare. A central office has been established at the headquarters of the Department of Health which will act as a clearing-house for information for all forces in the field and conduct a continuous campaign of educational publicity.

Co-operation without amalgamation is the object of the association. The individuality of the various organizations has been in no way encroached upon. Nor has any new appealing body been thrust into the field. The expenses of the central office have been voluntarily provided by several organizations out of funds appropriated for particular branches of the work in their own budgets. These bodies will accordingly take responsibility and receive due credit for the specific activities to which they contribute. Never before in this city has so complete and harmonious a plan of co-operation been effected in this field.

A general committee will be made up of representatives of each organization included, of which it is expected that there will eventually be over one hundred in the membership of the Association. From this body an executive committee of eight has been elected to carry on the work with an Executive Secretary. Sub-committees will provide for complete representation of all interests.

The executive committee consists of Dr. S. Josephine Baker, Chief of the Department of Child Hygiene, of the Department of Health, chairman; Paul E. Taylor, of the New York Milk Committee; Miss M. L. Daniels, of the New York Diet Kitchen Association; H. Fleischman of the Educational Alliance; John A. Kingsbury of the Association for Improving the Condition of the Poor; Dr. G. R. Pisek of the Post-Graduate Hospital; Mgr. D. J. McMahon of the Association of Catholic Charities; and A. E. Wakeman of the Brooklyn Children's Aid Society.

Besides the organizations directly represented on the executive committee the Association will include the other milk station organizations of the city, such as the Nathan Straus' Laboratories, the Henry Street Settlement, and the Babies' Dairies; hospitals and dispensaries which treat children under two years of age; day nurseries; such social service agencies as the Charity Organization Society, the various Hebrew charities, ice distributing and outing agencies; and agencies doing research work such as, the Bureau of Municipal Research, the Russell Sage Foundation, and the Rockefeller Institute.

The activities of the Association will be confined at present to children under two years of age.

Boiled Milk for Infants.

The Medical Officer for May 25th gives an abstract of Dr. Janet E. Lane-Claypon's recent report to the Local Government Board upon the available data in regard to the value of boiled milk as a food for infants and young animals. (New Series, No. 63, London, Wyman & Sons.) Dr. Lane-Claypon has reviewed the literature of the subject and has also investigated the matter in an experimental way. In her experiments one group of babies was fed on boiled cow's milk only, and the results were compared with those from a comparable set of babies fed in the ordinary way on untreated milk. Her general conclusions are of especial interest in view of some of the objections which have been raised to pasteurization and are stated by the Medical Officer as follows:—

"They are that there is apparently no serious loss of nutritive value produced by feeding an animal upon boiled milk derived from an animal of the same species; that when an animal is fed upon the milk of another species, the milk from which has been found to be suitable for this purpose, such small differences as have been found in the nutritive values of raw and boiled milk, have been in favour of boiled milk, and that the milk of the same species has a considerably higher nutritive value for that species than the milk of any other species."

The Pollution of Wells.

"Well and spring pollution is altogether too common an occurrence in these days, when engineers, particularly those engaged in building and operating waterworks, must realize that the ordinary principles of common cleanliness are necessary to enable people to herd together safely in our cities in ever-increasing numbers. Unfortunately, a clear well water carries in its very sparkle a false sense of security to which even water-works officials are susceptible. From a well several hundred feet deep in the basement of an office building in a western city, the bacteriological tests never showed more than three to five bacteria per cubic centimeter, yet periodically an intestinal form would be found. A large sewer in an adjoining alley, not 15 ft. from the well, and a rusted leaky casing afforded all the explanation needed to trace the path of the germs to the tenants who were inclined to blame the water for such sickness as occurred.

A leaky conduit from a spring to the pump well in a Middle West city, over which a flood carried sewage, and the Rice well contamination by sewage-laden ground water reported on page 614, both warn the waterworks engineer to look over his plant carefully and frequently, lest the encroachments of improvements in the way of sewers, the abandonment of old pipes or some other condition may not cause contamination during an unusual flood or downpour in a supply which his semi-occasional bacteriological analysis tells him is beyond reproach.

At Lincoln it was necessary for the ground water surrounding the well to be high at the same time the sewer was obstructed, for it to be possible for the sewage to travel to the well by a number of more or less open channsel, which surrounded the old well and of which there was no record. The presence of these pipes and ditches was not suspected by anyone until excavations were made and they were uncovered. Anyone who has ever opened excavations near a water-works property 20 years old will not be surprised at this.

This is the time of year when floods are likely to wash the naturally formed schmutzdecke over a gallery laid in a river bed or adjacent to it. Perhaps the gallery may be entirely uncovered, as at Iowa City last year, reported in this journal on September 30, 1911, or the floods may rise above a manhole the cover of which is thought to be water-tight. At any rate, it will not be amiss to go over the system and look for contingencies of which no one will ever hear if provided for, but which may end in material loss to a city not only of lives, but reputation, in case the right combination of circumstances occur. 'Opportunity has long hair in front but is bald-headed behind,' is an old saying. A few dollars spent in a sanitary inspection may accomplish a great deal more than many thousands spent later on."

Editorial, End. Record, Vol. 65. No. 22, June 1, 1912.

The Jug on the Doorstep.

"In spite of special efforts to remove refuse, manure, etc., from the thickly inhabited parts of Peterborough during the exceptionally hot weather last autumn, there was a considerable amount of infantile diarrhoea and eighteen deaths resulted. In this connection Dr. R. W. Jolly, M. O. H., has called attention to the common practice of leaving an empty jug outside the door for the reception of milk. He points out that the vessel makes a happy hunting ground for flies, to say nothing of the dust from the road that is liable to be blown into it, the milk thus becoming a decidedly contaminated article of food."

The Medical Officer, April 27, 1912.

Health Study of a Mill Village.

Another contribution to the various local surveys and studies of tuberculosis conditions is that by the Rhode Island Anti-Tuberculosis Association in a little pamphlet entitled, "A Study of a Typical Mill Village from the Standpoint of Health." The study was made by Wallace Hatch and Miss Jane Barclay, Executive Secretary and Assistant Secretary of the association. To quote from the report:

"Each family in which there had been tuberculosis during the past five years—in-so-far as these families could be found—was visited, and an effort made to locate all old and new patients. In this village there were registered five tuberculous families at the time the study was commenced. House visits, enquiries and dispensary examinations during six months increased the list to twenty-five families where tuberculosis existed so recently as to warrant placing the family on the dangerous list.

A study of the employment of the present and former tuberculous patients showed that there were eighteen mill workers, of which seven were weavers, two spinners, one speeder, one carder and seven general mill hands; two were farmers, two home-keepers, one a bartender, one a clerk, and one a miller. In the twenty-five families, nineteen patients were employed under conditions which would probably lead to additional infections. One-hundred thirty-one persons, members of these families, had been exposed to infections and of this number only four had received physical examination. Seventeen persons had died of tuberculosis and there had been four new infections, since the original cases were reported. Six of the twenty-five families had been followed up by physician or nurse for long or short periods after infection or death of the patient and seventeen families had been instructed at some time and place about the communicability of the disease. Three patients were not known to a physician during their illness and sixteen were not known to the district nurse."

Municipal Health Ordinances.

A companion volume to "A Digest of Laws and Regulations of the Various States Relating to the Reporting of Cases of Sickness" has been issued by the United States Public Health and Marine Hospital Service. It is entitled, "Municipal Ordinances, Rules and Regulations Pertaining to Public Hygiene." It covers the period of January 1, 1910 to June 30, 1911 for all cities having a population of 25,000 and over. The volume deals with ordinances and regulations on communicable diseases, poliomyelitis, vaccination to prevent smallpox, spitting, food-stuffs, milk and milk products; meat, bakeries, garbage and refuse, and a score of other subjects. Under the various heads all ordinances are grouped.

"There is a general demand for the creation of a special Ministry of Hygiene in order effectually to cope with what is considered to be one of the greatest evils in modern France. In connection with the agitation there is a movement in favor of compulsory registration of tuberculosis patients. The Health Commission of the Chamber of Deputies will shortly open a debate on the advisability of this measure, and its President, Deputy Joseph Remach, has asked the Academy of Medicine to submit a report on the subject, and it is expected that the report will recommend a bill for compulsory registration."

Tuberculosis and New York's Building Code.

The Committee on the Prevention of Tuberculosis of the New York City Charity Organization Society has issued a little pamphlet in the form of a memorandum submitted to the Committee of the Board of Aldermen on the proposed new building Code. The memorandum points out many defects in the code as drafted and urges further consideration and revision before it is adopted.

Among other defects, the memorandum shows that the code would allow for dark rooms in unlimited numbers and in a variety of different ways. It would be easy, moreover, the committee contends to evade the law and the code with regard to the size of courts, and the provision of necessary ventilation from outside. In addition, the code makes inadequate provision for the erection of factory, loft and office buildings by providing insufficient free space for light and air.

These and many other provisions of the suggested code are attacked by the committee on the ground that because they tend to provide inadequate light and ventilation, they tend therefore to increase the spread of tuberculosis.

Vaccinating Against Tuberculosis.

"It has become an article of faith among epidemiologists that if tuberculosis is to be successfully dealt with it must be attacked from all sides. What those several points of attack are will be familiar to our readers, and do not need to be recapitulated. A comparatively new weapon is, however, referred to by Prof. Calmette, of Lille, in the April number of *The Universal Medical Record*. ('Some Considerations Concerning the Question of Vaccinating against Tuberculosis' by Prof. Calmette, *The Universal Medical Record*, April, 1912, p. 299.) After pointing out that the new methods of diagnosis by tuberculin show that among 100 city dwellers of 20 years and upwards, it is difficult to find seven or eight who have not been at some time or other attacked by the tubercle bacillus, and yet that even where the consumptive death-rate is highest, only about one-fifth of the total deaths are due to tubercle, he argues that there must be a very large number of persons, who in some way or other, have acquired a resistance to fatal tuberculosis. The next step should obviously be to attempt to obtain an artificial immunity. The success which has attended the researches of Prof. Calmette with this object in view is related in the article to which we have referred, and which will well repay perusal at the hands of all administrative health officers. It is a legitimate question to ask, he says, whether, in the long run, 'it may not be to the advantage of the State to enforce the vaccination of young infants against the grave forms of tuberculosis, to which they succumb in such great numbers, by means of a strain of bacilli suitably attenuated and rendered unfit for the formation of grey granulations."

The Medical Officer, April 20, 1912.

Niagara Falls Reforms.

Niagara Falls, N. Y., which has had the unenviable reputation of having one of the worst water supplies in the country, and which has been characterized by Professor William T. Sedgwick as "one of the worst plague spots, if not the very worst, in respect to typhoid fever in the United States," has at last reformed, having installed a rapid mechanical filtration plant with a reserve hypochlorite outfit. Operations under the new system commenced January 1st of this year, and a marked falling off in typhoid is already apparent. This step on the part of Niagara Falls is a source of congratulation not only to the city itself, but to the whole country, the prevalence of high typhoid here being especially objectionable because of the large number of visiting tourists who come in contact with the water.

Eng. Record, Vol. 65, No. 22, June 1, 1912.

Conservation of Human Life.

A brief for the Owen Bill providing a United States Public Health Service, entitled, "Memorial Relating to the Conservation of Human Life" has been prepared by Prof. Irving Fisher and Miss Emily F. Robbins. The Memorial is published as Document No. 493 by the Government Printing Office, Washington, D. C. It deals with the waste from disease; the present methods of checking the waste and the lack of co-ordination in effort; and the further health work necessary, especially a National Bureau of Health. An appendix presents some interesting data on the methods of those who have opposed the Owen Bill.

Government List of Industrial Poisons.

The Department of Commerce and Labor is distributing a bulletin giving for the first time the English translation of the list of industrial poisonings which the International Association for Labor Legislation through its various national organizations has been revising and completing since 1908. Prof. Samuel McCune Lindsay, President of the New York Association for Labor Legislation, gives it as his opinion that the list will be a very valuable guide to the better recognition of obscure occupational diseases as well as a help to the prevention of the more obvious risks to health to which many workers are now daily and unnecessarily exposed. In four parallel columns the industrial posions and other harmful substances found in industrial processes are set out with the branches of industry in which poisoning occurs, the mode of entrance of the poison into the body, and the symptoms of poisoning. So far as possible there is also indicated those measures of relief which are to be employed at the first manifestation of poisoning.

Commissioner Charles P. Neil, commenting upon the need for the work which his department has just completed, writes, "In 1910 at the time of the publication by the Bureau of Labor of the earlier list of industrial poisons little accurate information was available concerning the prevalence of cases of industrial poisoning in American factories. No state had made any legal requirement for the reporting of cases of industrial poisoning, and in the absence of such definite basis for statistical information a general impression had prevailed that American employees were largely exempt from the dangers from which industrial workers in other countries suffered."

Special investigation in the white phosphorus match industry, the inquiries of the Illinois State Commission on Occupational Diseases, and a study of the white lead and lead oxide industries disclosing 388 specific cases of lead poisoning in 16 months, and an investigation of 60 deaths from lead poisoning occurring in New York in 1909 and 1910, all served to direct public attention to the need for legislative regulation. As a result of the disclosures of these investigations, and because of a realization of the importance of full and accurate knowledge concerning the existence of dangers from industrial poisons, laws were enacted during 1911 and 1912 in eight states—California, Connecticut, Illinois, Michigan, New York, Wisconsin, Maryland and New Jersey, requiring reports by physicians of all cases of certain occupational diseases occurring in their practice.

Registration of Pulmonary Tuberculosis.

To anti-tuberculosis workers, health officers and others who have been working for the reporting of living cases of tuberculosis, a monograph recently issued by the New York City Department of Health will prove both a stimulus and a reminder of possible failure, where the results have not been what they should have been. The book is entitled "The Registration and Sanitary Supervision of Pulmonary Tuberculosis in New York City," and has been prepared by Dr. John S. Billings, Chief of the Division of Communicable Diseases, of the Department of Health of New York City.

After a historical sketch of the Health Department's efforts, backed by those of voluntary anti-tuberculosis workers, to secure better registration and supervision of tuberculosis cases, Dr. Billings summarizes the present activities of the Department along this line, thus:

(1) Notification and registration of all cases of tuberculosis, 24,513 new cases of pulmonary tuberculosis reported in 1911.

(2) Free bacteriological examination of sputum.

(3) Visitation of Consumptives in their homes and continuous supervision of cases in tenement houses by a corps of 155 trained nurses.

(4) Educational measures of various kinds, circulars, lectures, exhibits, newspaper articles.

(5) Free disinfection by the department.

(6). Five classes of institutions provided, including hospitals for advanced cases, clinics sanatorium for early cases, day camps, and the Tuberculosis Hospital Admission Bureau.

(7) Forcing certain classes of patients into a hospital and retaining them there.

(8) Enforcing regulations concerning spitting in public places.

(9) Enforcing regulations forbidding use of public drinking cup.

(10) Research studies on various lines.

Dr. Billings discusses in detail each of these various activities and emphasizes particularly the methods employed in the reporting, registration and supervision of living cases of tuberculosis.

The book is No. 1 (February, 1912), in the Monograph Series of the New York City Department of Health.

Rome Bread Served in Paper.

"The municipal authorities at Rome, Italy, have decreed that no bread or rolls shall be served in restaurants until wrapped in paper with the seal of the bakery attached. The cafes have accepted the order."

Public Health Journal, June, 1912.

New York Conference of Mayors.

At the recent Annual Conference of Mayors of New York State, the following resolutions were adopted on matters of interest to public health workers:

WHEREAS, we feel that among the greatest curses with which the cities of this State have to contend are prositution and the diseases incident thereto, therefore, be it

Resolved, That it is the sense of the Third Annual Conference of Mayors and officials of cities of the State of New York, that it is decidedly opposed to the official recognition or segregation in any manner of houses of prostitution, and that the Mayors here assembled will do everything in their power to repress and aid in the suppression of prostitution.

Resolved, That this, the third Conference of Mayors and other officials of the cities of the State of New York, express its gratification at the substantial progress of the most important and immediately practicable movement for the conservation of life and human efficiency—the suppression of tuberculosis. Already nineteen counties have established or voted to establish tuberculosis hospitals. In seven cities, eight municipal or charitable tuberculosis hospitals are now in operation and five additional city hospitals are assured. Twenty-five localities have free tuberculosis dispensaries, of which twelve are supported by municipal appropriation; and sixty-one tuberculosis visiting nurses are employed in forty-eight localities, of which twenty-one are provided at public expense, and be it further

Resolved, That this Conference earnestly urge Boards of Supervisors, in counties in which no tuberculosis hospitals are provided for, to establish such hospitals at once; and further, that we urge cities and villages that have no dispensaries or visiting nurses to provide such preventive and relief agencies promptly, to the end that humane care and treatment be offered to those afflicted with this preventable and curable disease which is now in most cases neither prevented nor cured, and that thousands of others who, under present circumstances, will fall victims to its ravages be saved to their families and their communities.

New York's Birth Rate.

The Commissioner of Health of New York, calls attention to the fact that the number of births recorded in New York City during the past five months of 1912 was 56,258 as against 56,082 for the corresponding period of 1911. This rate would indicate a decrease of 1.10 per 1,000 of the population which means if this low birth rate is to contiune, that there will be 5,690 fewer births recorded during the year 1912 than during 1911.

It is not believed that this decline in the statistics is due to natural causes. A comparison of the birth and death indices for the month of May in the Borough of Manhattan shows that there were 17 children under three months of age who died during the month of May and whose births had not been recorded. If we remember that one out of every five children dies during the first three months of life and as this method of ascertaining the number of births not reported applies necessarily only to those that have died, it is very evident that the number of births not reported during the month of May must be considerably larger than the 17 referred to. Again, the decline is most marked in the Borough of Brooklyn, where the birthrate has fallen two points during the first five months of the year, while, on the other hand, the infant death-rate of those under one year of age has remained stationary. If the decline in the rate were dependent upon natural causes, it would be accompanied by a decrease in the number of children dying under one year of age, but we find, in the Borough of Brooklyn, that the number of deaths of such infants in 1912 exceeded those in 1911 by 43. Moreover, the number of marriages reported in 1911 was 48,765, an increase of 2,348 over those of 1910.

From these figures it would seem to be evident that the decline in the birth rate is due to the fact that physicians and midwives have, in many instances, failed to report births. This is a matter of great importance both to the city and to its future citizens. In addition to the fact that vital statistics are thereby greatly impaired in accuracy, the amount of trouble and expense to which persons are liable in later life on account of this neglect, may be very considerable.

Tuberculin Test Defeated by Popular Vote.

The referendum vote on the tuberculin test ordinance recently held in Los Angeles was probably the first popular vote of its kind ever taken in this county. Although the ordinance was vigorously supported by the health authorities, it was opposed by the anti-vivisectionists, anti-vaccinationists, certain veterinary as dairy interests, and others. The result was a defeat for the ordinance by a majority of 5,152 votes. The ordinance was passed last November by the city council, and the vote was the result of activity by local dairymen in referring it to a popular election.

Streptococci from Milk and from the Human Throat.

Dr. E. C. Stowell and Mr. C. M. Hilliard in the April 1912 issue of the *American Journal of Diseases of Children,* report an investigation of a Comparison of the Streptococci from Milk and from the Human Throat. Their conclusions are as follows:

1. Streptococci from the human throat and from fresh milk very generally ferment one or more of the sugars, dextrose, lactose, maltose and saccharose, attacking them most readily in the order named. They do not generally ferment raffinose or mannite.

2. The streptococci of the sore throat and the normal throat show no cultural differentiation in relation to the carbohydrates used. Virulence tests might have separated the two groups.

3. The throat streptococci do not readily ferment at 20° C. any of the sugars used,

while the milk organisms attack the same sugars and to the same extent at this temperature as at 37° C. This is, perhaps, the most valuable differential feature between chained cocci from these two sources.

Garbage Disposal in Grand Rapids.

In the January-March bulletin of the Michigan State Board of Health, Dr. T. M. Koon contributes an interesting article on the garbage disposal of Grand Rapids. The city collects garbage twice a week, at a cost of $1.63 for each household per year. Under private collection the cost used to be $3.00 per year. The garbage, after collection, is delivered on tank cars, where the expense to the city ends. It is then shipped to a large piggery, three miles away.

From seven to nine thousand hogs are kept on a hundred acre farm. The garbage after arriving at the farm is cooked before feeding. Twelve hundred brood sows are kept and over ten thousand pigs are born every year.

Before the hogs are slaughtered, they are transferred to the "restaurants," and fed on cooked corn meal, to fatten them. The value of the hogs shipped to market is about $135,000 per year. All of the hogs are immunized against hog cholera while nursing, so that there is no danger of the herd being decimated. Twenty four hundred tons of fertilizer are produced annually, which has a value of about $36,000. The entire plant is maintained under the best sanitary conditions. Dr. Koon makes the following comment: "If this kind of a plant can be run at a good profit without creating a nuisance, why is it not better for a city to dispose of its garbage in this way, than to invest in one of the expensive plants which is quite apt to prove an elephant on the hands of the municipality." He also states that "there is no doubt but that as cities begin to understand the possibilities of this method of disposal, fewer of them will be investing in the expensive incineration and reduction plants."

In order to get rid of combustible wastes and dead animals, the city operates an Engle crematory. The expense of operating this for 1911, was $2,568.61.

Public Health in Michigan.

Public Health, the quarterly publication of the Michigan State Board of Health always contains matter of interest, not only to the citizens of that state but to all interested in health conservation. The January-March number contains the proceedings of the Michigan Health Officers' Convention which was held January 30–31 of the year. Dr. Victor C. Vaughan, the president of the Michigan State Board of Health contributes an important paper on the Michigan Method of Water Analysis.

Other important contributions were received from Miss Adele McKinnie, who is conducting an investigation of the extent, distribution and causes of feeble mindedness and epilepsy in Michigan, Dr. Guy L. Keifer on the Medical Milk Commission, Dr. T. M. Koon, on Garbage Disposal, Mr. John A. Hatch, Jr., on Hotel Sanitation, and Dr. A. S. Warthin contributes a preliminary report on some occupational diseases occurring in Michigan.

The many health officers in attendance were enthusiastic, and the greatest achievement in the convention was the organization of the Michigan Health Officers' Association. Much credit is due to Dr. R. L. Dixon, secretary of the State Board of Health, for the successful planning and consummation of the conference.

Tenth Annual Conference of State and Territorial Health Authorities with the Public Health and Marine-Hospital Service, Washington, June 1, 1912.

The tenth annual conference of the State and Territorial health authorities of the United States with the Public Health and Marine-Hospital Service, provided for by section 7 of an act of Congress approved July 1, 1902, was held in Washington, June 1, 1912.

The following resolutions were adopted by the conference:

MORBIDITY REPORTS.

In order to make available to the health authorities of the States, Territories, and insular possessions of the United States, for their use and guidance in the protection of their respective communities, information regarding the prevalence and geographic distribution of certain diesases, and the occurrence of outbreaks and epidemics, be it resolved:

1. That the health authorities of the States, Territories, and insular possessions of the United States, including the District of Columbia, shall notify the Surgeon General of the Public Health and Marine-Hospital Service immediately by telegraph (collect) and letter upon the occurrence of a case or cases of cholera, yellow fever, typhus fever, plague, or Rocky Mountain spotted or tick fever, giving the number and location of cases, and that said authorities shall render monthly reports of the number of cases notified of smallpox, leprosy, scarlet fever, measles, diphtheria, typhoid fever, poliomyelitis, cerebrospinal meningitis, dysentery, Rocky Mountain spotted or tick fever, and other diseases notifiable in their respective jurisdictions; said monthly reports to be made on or before the 20th day of each month for the preceding calendar month, and to give the distribution of cases of smallpox, leprosy, poliomyelitis, cerebrospinal meningitis, Rocky Mountain spotted or tick fever, and typhoid fever, by counties, or by counties and cities, or by towns (townships), or by towns (townships) and cities; and that when in a State one or more cities are excepted by statute, charter, or otherwise from reporting the occurrence of the notifiable diseases to the State department of health, and the State report therefore is exclusive of cases occurring in such cities, the cities thus excluded shall be enumerated.

2. That upon the occurrence of an unusual outbreak, or in the event of a sudden increase in the number of cases of smallpox, scarlet fever, diphtheria, typhoid fever, poliomyelitis, cerebrospinal meningitis, or Rocky Mountain spotted or tick fever in any locality, the Surgeon General of the Public Health and Marine-Hospital Service shall be immediately notified by telegraph (collect) and letter of such unusual outbreak or sudden increase.

3. That in the primary notification of smallpox to local health authorities the date when the patient was last vaccinated and whether the disease is of the benign or virulent type shall be stated; that in all outbreaks of smallpox in which one or more deaths occur a report of such data as can be obtained regarding the origin of the first case or cases and the history of the outbreak shall be made to the Surgeon General after the subsidence of said outbreak; that all reports of cases of smallpox made by the State or other health authorities to the Surgeon General shall be divided into four classes:

(*a*) Those vaccinated within a period of seven years preceding the attack.

(*b*) Those whose last vaccination occurred more than seven years antedating the attack.

(*c*) Those who have never been successfully vaccinated.

(*d*) Those in which no definite history is to be obtained.

4. That in reporting the occurrence of cases of leprosy such data as it is possible to obtain regarding the patient's history shall be given.

5. That the Surgeon General shall, under the direction of the Secretary of the Treasury, pursuant to section 4 of an act approved February 15, 1893, entitled "An act granting additional quarantine powers and imposing additional duties upon the Marine-Hospital Service," compile and publish the reports forwarded in compliance with the foregoing in the Public Health Reports for the Information of the health authorities of the several States, Territories, and insular possessions, including the District of Columbia.

PHENOL COEFFICIENT OF DISINFECTANTS.

Resolved, That the United States Public Health and Marine-Hospital Service Hygienic Laboratory Standard Method for the determination of the phenol coefficient of disinfectants be recommended to the several State boards of health as the standard method; that all regulations regarding disinfectants be based upon this standard; and that the phenol coefficient be required to be stated on the label of each package containing such disinfectant.

CONTROL OF TYPHOID FEVER.

Resolved, That a committee be appointed to recommend a working plan for the control of typhoid fever and practical measures which can be generally enforced for the prevention of this disease.

Resolved, That all cases of typhoid fever should be placed in properly constructed and conducted hospitals, unless it be possible to isolate the patient at home with a trained nurse in charge.

CEREBROSPINAL MENINGITIS.

Resolved, That the Surgeon General appoint a committee to report further on the subject of cerebrospinal meningitis at the next meeting.

Public Health Reports, June 7, 1912.

Leprosy in the United States.

The Public Health and Marine Hospital Service has recently made a compilation of new cases of leprosy, reported in the United States in 1911. There were 40 such cases recorded and 146 known cases present on January 1, 1912. Besides these cases in the United States, 1,217 new cases were reported in Hawaii and the Insular Possessions, making a total of 3,478 cases present at the beginning of the year.

Public Health Reports, June 14, 1912.

First International Congress of Comparative Pathology.

The First International Congress on Comparative Pathology will be held at the Faculty of Medicine at Paris from October 17 to 23, 1912. The congress, the object of which is exclusively scientific, will bring together men of science interested in pathology in the widest acceptance of the world. Those promoting the congress desire interested scientists in the United States to participate. Communications should be addressed to the secretary general of the congress at Paris.

Professor Burt R. Rickards.

Professor Burt R. Rickards has severed his connection with the University of Illinois to accept the position of assistant director and bacteriologist in charge of the new biological department of Ely Lilly and Company of Indianapolis.

A local paper in expressing regret at Mr. Rickards' departure from the University makes the following comment:

"In the withdrawal of Prof. Rickards from the University of Illinois the little babies of Champaign and Urbana lose a real friend and it may be many years before the loss will be made up, even in a way.

"It was Prof. Rickards who brought to the attention of the people of these two cities the fact that they were being supplied with milk which was not fit for human consumption. He did not merely make the statement that the milk supply of these cities was terribly contaminated but he went before the people and proved to them that it was.

"Following these proofs by Prof. Rickards the city councils of both Champaign and Urbana lost no time in passing ordinances governing the sale of milk in these cities and as a result of these ordinances there is not the least doubt in the minds of those who have become informed, that many babies will be saved the present summer.

"The Gazette and all people who are familiar with the work Prof. Rickards has been doing will deeply regret that he should leave the University of Illinois."

An Important Step in the Study of Malaria.

"At the meeting of the American Society of Tropical Medicine in Atlantic City on June 3d, Dr. F. Creighton Wellman, dean of the Tulane School of Tropical Medicine, made the interesting announcement that Dr. C. C. Bass had succeeded in isolating the parasite of malaria, first growing it for seven weeks in artificial media in New Orleans, and subsequently, in the Canal Zone, being enabled to watch the entire cycle of development, the process of schizogony, etc. The studies of this society are attracting increased and deserved attention and are fraught with importance in their bearing on life in our Southern States as well as in our newly acquired tropical possessions."

New York Medical Times, June 15, 1912.

Community Health.

"When the rules and restrictions placed over us by a city health department seem strict, exacting and even martinetish, and we are on the verge of taking a kick at it, we should stop and contrast the health of our community with the health of cities fifty, one hundred, and two hundred years ago. The time in the past is not far ago when fever was an annual scourge and smallpox was once so common that the unpitted person in England was a rarity. Our cities then waged a losing battle with disease. They accepted an epidemic as nature. And several economists even went so far as to say that disease was a necessary evil, intended to check the growth of population and thereby keep up wages. We know better now. We know that science can fight the unseen, insidious foes of health. If a mild epidemic arises in a city, we are startled as by the abnormal; but with the shock comes a reliance that we are able to cope with the danger. This great change in community health has been wrought by rules and restrictions of the city health department.

"Health is chiefly a question of attention to small things. We usually keep well if we are not careless. But we are careless if we do not observe those numerous little health regulations, science, through our city health departments lays down for us. Surface cleanliness is too often a mask of gross uncleanliness. Surface cleanliness is not cleanliness but vanity. That cleanliness must be real the health department insists. So it sees that we pay attention to our drains; that we watch the disposal of our waste; that we keep our living quarters open to the sun and do not crowd them. It pokes into our lives, and finds the uncleanliness of which we have not dreamed. By so doing it maintains community health.

"Community health is far more important than personal health. Cities must be better watched and better attended than the individual; for the only protection of the individual is community health. Unfortunately, we do not always appreciate this. We concern ourselves only with our immediate personal health. When we are ill and suffer, we rush to the physician for medical attention and relief. But the best efforts of our physician, his greatest watchfulness, his utmost knowledge, cannot protect us from community uncleanliness. If the health department cannot keep its community clean, then all live in a danger zone.

"The protection a city health department accomplishes has been realized. In the worst graft ridden city, it is not often that the health department is the prey of the boss. The most arrant grafters, the most avaricious bosses, have in recent years kept their hands off health departments so far as efficiency was concerned. . . . To guard health, the health department must act quickly, and to act quickly there must be unhampered power. Better give hearty, sincere co-operation to a city health department in all its measures, for behind the rule that pinches is usually the scientific principle that shields community health from the old foe, the epidemic."

Los Angeles Municipal News, June 12, 1912.

Can't Play it Alone.

"A health department, to be efficient, should have a number of co-partners.

"First of all comes the public press, acknowledged not only as a disseminator of news, but chiefly as an educator and moulder of public opinion. The press of Buffalo is the peer of any in the world, and while there may be differences of opinion as to the manner of obtaining certain results, yet all strive to accomplish the greatest good.

"Among the other co-partners are the department of education, public works, police, poor, railroads, the numerous clubs and philanthropies, and above all, the great public—the final tribunal.

"Buffalo's health department is frank to acknowledge its indebtedness to all these."

Buffalo Sanitary Bulletin, Vol. V., No. 4.

VOL. II. AUGUST 1912 No. 8

AMERICAN
JOURNAL OF PUBLIC HEALTH

MUNICIPAL DISINFECTION IN NEW YORK CITY AS RECENTLY REORGANIZED

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Bacteriologist

Assisted by B. Junger, Ph. G.

Brief Resumé of Former Methods of Disinfection in New York City

Sulphur was the standard material used for the disinfection of rooms up to 1895, four pounds of roll sulphur being burned to disinfect 1000 cu. ft. of space. This was gradually discarded in favor of formaldehyde gas in 1902. At first this was generated from formalin by heat from a flame, later a combination of a solution of formaldehyde, aluminium sulphate solution and lime was utilized; one pound of lime (fresh unslaked granular) being allowed for every 1000 cubic feet of space. Over this was poured a mixture of six ounces of formaldehyde, 40 % strength, and two ounces of a saturated solution of aluminium sulphate; a fairly rapid evolution of the gas resulted.

This method was open to several objections, one of the most important being the excessive weight of the materials, another was the irregularity of results. The conditions in New York City required that the disinfectors should carry by hand the chemicals and necessary utensils required for disinfection, and the weight of this material amounted to 25 lbs. for every 10 disinfections of 1000 cu. ft. of space. It was therefore necessary to adopt or devise some combination of chemicals which would prove satisfactory for the purposes of municipal disinfection. In all, some 55 formulae were tested; first, as to the efficiency, second, as to the time required for a compound to disinfect properly; third, as to the cost; fourth, as to the danger of fire; fifth, as to ease of transportation; the last factor being important owing to the frequent long distance from the base of supplies.

(a) Technique Employed. The limit of time selected was 4 hours. This period having been found to impose the least hardship upon the many people whose small apartments require disinfection and who frequently have to spend that time in the parks and streets. The method of testing the effectiveness of disinfection was by means of threads, dipped in 24 hour cultures of B. coli and B. pyocyaneus dried in air and placed on cards according to the Wilson Method, or in tissue paper envelopes. After the test, these threads were immediately removed with sterile forceps and placed in test tubes containing a suitable medium; B. coli in lactose neutral red fermentation tubes, and B. pyocyaneus in the synthetic medium later described. These tubes were then incubated at 37 degrees C. for three days after which readings were made.

The formulae can be grouped as follows:—

1. Mixtures of lime, postassium permanganate and formaldehyde and different salts in varying proportions.
2. Potassium permanganate, and formaldehyde in different proportions.
3. Potassium permanganate, sand and formaldehyde in different proportions.
4. Potassium permanganate, paraformaldehyde and water in different proportions.
5. Solidified formaldehyde and heat.

The standards of efficiency, time limit, cost and weight eliminated the greater part of these formulae.

(b) Preliminary Tests. Many of the combinations were given preliminary trials to note any possible defects in chemical reaction, bulk and cost, and some of those rejected for any of those reasons are grouped together in Table one.

TABLE 1.

Formulae rejected after preliminary trial

Lime	Potassium Permanganate	Formaldehyde	Water
Ounces per 1000 cubic feet	Ounces per 1000 cubic feet	Ounces per 1000 cubic feet	Ounces per 1000 cubic feet
5	2.5	5.1	5.1
4.8	2.5	5.1	5.1
	9	10	5
	8	10	5
	10	7	3.5
	20	6	3

A series of experiments were also tried in which sand was used as a mechanical means of checking the violent reaction of the potassium permanganate but the formulæ were rejected as too much formaldehyde was retained in the residue.

(c) Final Tests. Those compounds which passed the preliminary trial were then tested in room disinfection and sub-divided again as follows:

1. Compounds which required five to six hours to complete the destruction of the testing organism, but fulfilled the requirements as to weight, cost, etc. (Table two).

TABLE 2.

Formula giving good result in 6 hours time

TEST 1. Material per 1,000 cu. ft.	Ounces.	
$K_2Mn_2O_8$	5	Tested May 29th, 1910.
CHOH	6.8	Amount of gas set free by this method, 41%.
H_2O	2.5	Volume of gas tested by Lockerman's & Kroner's apparatus.
Lime	2.5	Size of room 1129 cu. ft. of space, time 6 hrs.
		24 hrs. cultures of B. pyocyaneus B. coli used on threads in envelopes.

Cultures	Growth	No growth	
B. pyocyaneus	..	10	Total number of tests exposed, 20
B. coli	..	10	Number of tests showing growth
B. pyocyaneus..	5		Number of tests not showing growth 20-100%
B. coli			

As this formula seemed to meet all the requirements except the time limit, it was repeatedly tested in rooms of different size to ascertain if this factor could not be reduced, but without any change in the results.

2. Those compounds which resulted in the destruction of the testing organism after four hours exposure, but were rejected on account of excessive weight, cost, etc. (Table three).

TABLE 3.

Formulæ giving good results in 4 hour room disinfection, rejected on account of excessive weight, cost, etc.

No. of Ounces	Lime	Potassium Permanganate	Formaldehyde	Water	Oxalic Acid 1/10
Test	Ounces per 1000 cubic feet	Ounces per 1000 cubic feet	Ounces per 1000 cubic feet	Ounces per 1000 cubic feet	Ounces per 1000 cubic feet
		20	20	10	
		10	9	45	
	10	5	10	5	5
	8	7	5	10	5
	3	3.05	5.6	3	
	6		5	5	5

Other mixtures having a reduction of 20% in the amount of potassium permanganate or of 10% of the formaldehyde and water gave equally good results but had the same objections.

3. Those compounds which brought about a successful disinfection in four hours time and were otherwise satisfactory. (Table four).

TABLE 4.

Compounds Causing Death of the Testing Organism in Four Hours and Meeting all the Requirements, as to Cost, Ease of Transportation, etc.

FORMULA 1.

Potassium permanganate	30 grammes or 1 ounce.
Paraformaldehyde	75 grammes or 2.5 ounces.
Water	90 grammes or 3 ounces.

FORMULA 2.

Fumigator Compound.
Solidified Formaldehyde.
Carbolic Acid.
Glycerine, etc.

In this last division there were only two compounds to be tested; first, a mixture of paraformaldehyde, potassium permanganate and water; and second, a solidified formaldehyde compound, consisting of formaldehyde, carbolic acid, glycerine and other chemicals; the compound being volatilized by the aid of a flame.

At this time also an extended series of analyses were made for the purpose of ascertaining the amount of formaldehyde gas evolved by these various compounds, as well as the amounts remaining in the residue. Thanks are due to Dr. Banzhaf and Miss B. Junger for their aid in this direction. The evolution of gas was tested by the Lockerman and Kroner method, and also by means of the Kjeldahl flask. The residues were also tested for the amount of residual formaldehyde. A large number of tests were made and the conclusions drawn were as follows.

1st. That in the lime, aluminium sulphate and formaldehyde method of disinfection the evolution of gas is less complete than has generally been supposed. This also holds good for the potassium permanganate, and liquid formaldehyde method.

2nd. That with the paraformaldehyde and permanganate method the results obtained were more satisfactory, the amount of gas evolved running as high as 87%.

The method of testing residue for residual formaldehyde. After the evolution of gas had ceased, the residue was carefully weighed and thoroughly mixed; 50 gms. were then taken and washed thoroughly with water, filtered and the filtrate diluted to 500 c.c. with distilled water. Of this dilution 20 c.c. were taken for analysis, and tested according to the iodine—thio-sulphate method, in order to ascertain the amount of formaldehyde present. The remainder of the residue was then dried by means of a water bath and desiccator, the loss in weight noted, and from the resulting figure the amount of formaldehyde present in the entire residue calculated. Records of the results of some of the tests are given in the pages at the end of the section.

Much work has recently been done both here and abroad, with combinations of paraform and potassium permanganate and water. Lockerman and Kroner have done considerable work in this direction. In testing the paraformaldehyde permanganate method for municipal disinfection we found that the following amounts of the chemicals made a good mixture and gave sufficient formaldehyde to disinfect test-threads in 1000 cubic feet of space in four hours time.

Paraformaldehyde	30 grammes
Potassium Permanganate	75 grammes
Water	90 grammes

The two chemicals are put up separately in small boxes containing sufficient material to disinfect 1000 cubic feet of space, and carried by the disinfector to the infected house. Here the two chemicals are thoroughly mixed in small deep tin pans ($\frac{1}{2}$ quart size), then the water is added and the mixture again thoroughly stirred. The evolution of gas is comparatively slow in starting, and this gives the disinfector time to leave the room and seal the door properly without being annoyed by the fumes of formaldehyde. The evolution of gas is practically completed in 5 to 10 minutes.

The second method which was found most excellent in many respects was carried out by means of a fumigator. This fumigator consists of a receptacle or deep cup containing a layer of paraffine and a circular wick to which air is admitted through spaces cut in the sides. In the upper part of this receptacle another cup containing 48 grammes of the mixture of solidified formaldehyde is placed. The candle when ignited is set in a shallow pan containing cold water. The evolution of gas takes place with quiet bubbling, the entire process being completed in one half hour.

Both of these methods show distinct advantages over that formerly in use; first, on account of the greater amount of gas evolved; second, because of the light weight of the chemicals used, thus giving a better disinfection and avoiding one of the great objections to the former method where a disinfector had to carry from 50 to 100 pounds, often returning for as much more in order to complete a day's work.

The following table of ten disinfections of 1000 cubic feet of space illustrates the difference in weight of outfits to be carried.

1. Lime and Formaldehyde Method		2. Paraform and Permanganate Method		3. Fumigator Method
Lime	10 lbs.	Paraform	10 oz.	
Formaldehyde and Al. Sulp. Sol.	6.25 "	Potas. Permang.	25 "	2.6 lbs.
Pans	.5 "	Cartons	3 33	
Cartons	1.35 "	Pans	13	
Bottles for carrying Sol.	2.5 "			
Total	20.26 lbs.		51.4 oz. 3.21 lbs.	

In any method of disinfection involving the use of heat, one of the most important considerations is of course the avoidance of the risk of fire. In our experiments many methods were rejected on this ground alone, and this was one of the most important factors determining the final choice of a routine method. A slight risk of this kind is attached to combinations of paraformaldehyde and potassium permanganate, but the advantages of such a combination are so obvious that it is worth while to find some means by which it can be used with safety. The Germans found that intense heat was evolved by pouring small quantities of water upon large masses of paraform and permanganate, thus bringing about very rapid action, but at the same time producing a vivid flame. They guard against this danger by first mixing together the permanganate and water to which soda is added in small quantities, and last of all the paraformaldehyde. They, further, recommend the use of small vessels for containers, thus dividing the charge, and effectually guarding against any danger from fire which might otherwise be present.

As the result of the work of others and the investigations reported here, the Board of Health decided in October 1910 to adopt the paraform permanganate method for their routine room disinfection and this method has been utilized with satisfactory results during 1911. The tests are given in detail at the end of this article.

Book-Disinfection. A question raised in the course of these experiments was as to the efficiency or the methods usually applied to the disinfection of books; the opinion having been prominently advocated by some not familiar with previous investigations that the complete destruction of books is necessary after contact with a contagious disease. It was thought best therefore to make a series of experiments to re-test this matter. The method in common use consists of the exposure of books or papers to formaldehyde, gas-formaldehyde, gas and heat or heat alone.

The following work was planned and carried out as follows:—

1. Exposure of books inoculated with bacteria to formaldehyde, alum. sulphur and lime method and heat in varying amount for 3 hours.
2. Exposure of books inoculated with bacteria to formaldehyde, aluminum, sulphur and lime method at room temperature 24 hours.
3. Exposure of books inoculated with bacteria to the action of dry heat alone at a temperature of 50°-55°C. for 3 hours.
4. Exposure of books inoculated with bacteria to the action of dry heat alone at a temperature of 50°-55°C. for 24 hours.

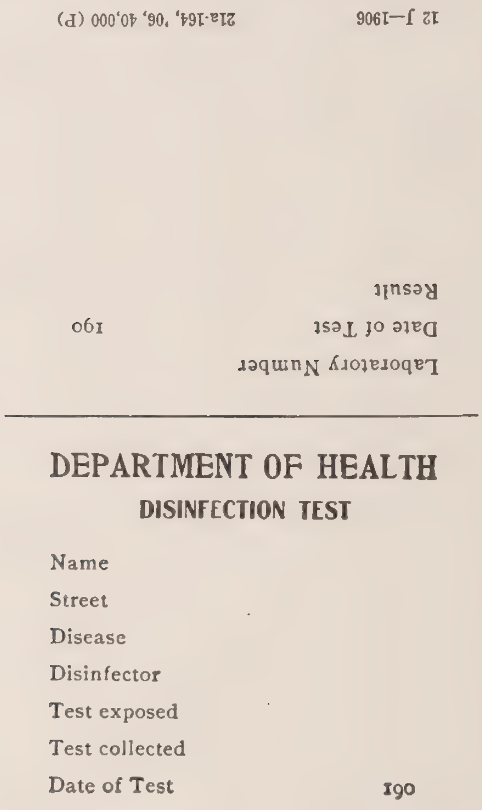
In this work I was assisted by Miss B. Junger and Miss Schweitzer, assistants at the Laboratory. The books used were ordinary library and school books and the tests were conducted in the following manner; one half of the books were closed and the other half had the covers fastened back so that the gas could penetrate freely. At intervals of ten, twenty or one hundred pages, a page was divided into 4 parts and these parts subdivided into squares, the parts were labeled as follows; upper outer corner, upper inner corner, lower outer corner, lower inner corner; these portions of the pages being most liable to contamination. In the squares thus marked, the surface of the page was directly smeared with a 24 hour culture of B. pyocyaneus and a 24 hour culture of B. coli. In a second square a thread inoculated with similar cultures was fastened with a drop of paraffine. After the tests, these threads were immediately removed with sterile forceps and inoculated into test tubes, the B. pyocyaneus in the synthetic medium and B. coli in lactose neutral red fermentation tubes.

The paper squares were then cut out and dropped into similar tubes and controls were made. All the test tubes were incubated at 37 degrees C. for three days after which readings were made.

CONCLUSIONS.

1. Ordinary routine room disinfection disinfects only the surfaces of exposed pages and covers of books.

2. Reviewing the formaldehyde aluminium sulphate and lime method, it appears that a large quantity of formaldehyde, 44 oz. per 1000 cu. ft., together with heat 50°-55°C., will destroy ordinary bacteria in books in 3 hours time if the books are opened and the leaves spread apart.



Laboratory Number

Date of Test 190

Result

12 J—1906 212a-164, '06, 40,000 (P)

DEPARTMENT OF HEALTH

DISINFECTION TEST

Name

Street

Disease

Disinfector

Test exposed

Test collected

Date of Test 190

Fig. 1.—Folder formerly used.

3. The various tests by heat alone show that a short exposure three hours at 49°-51°C. does not destroy all pathogenic bacteria.

4. A 23 hours exposure at 50° to 55°C. will destroy bacteria but is apt to warp the books by drying them excessively.

5. A three hours exposure at 55°C. to moist heat and formaldehyde will kill the bacteria and beyond a slight spreading of the leaves do no damage to the books.

Controlling Disinfection. The control of disinfection by means of tests is of comparatively recent origin, Koch in 1887 being the first to mention its use. He selected the B. prodigiosus and the B. pyocyaneus and grew them on a potato medium testing disinfection by exposing both culture medium and organism to the action of the disinfectant.

The method of testing disinfection formerly in use in New York City was that known as the Wilson Method having been elaborated by Dr. R. J. Wilson then Assistant Director in the Research Laboratory.

The method depended for its efficiency on the color produced by B. pyocyaneus, when grown in bouillon. The manner of using it was as follows. Fine cords were inoculated with this organism and fastened by means of a drop of paraffine to a folder. (See figure 1). These folders were sent out 2 or 3 times a week to the various boroughs, and distributed to the disinfectors, who placed the opened folders in the rooms to be disinfected, and left them there during the period of disinfection. Upon the completion of disinfection, they were removed by the drivers who called to remove the bedding for steam sterilization and were brought to the laboratory.

Here the threads were removed and placed in broth tubes and incubated for 5 days. They were then examined and those showing the color reaction, were marked positive and a record made. This most excellent method was in use a number of years. It was found, however, that these tests were easily contaminated in the process of handling and might thus lead to unfair deduction, 1st; as to the character of the materials used, 2nd; as to the mode of disinfections; 3rd as to the thoroughness of the process.

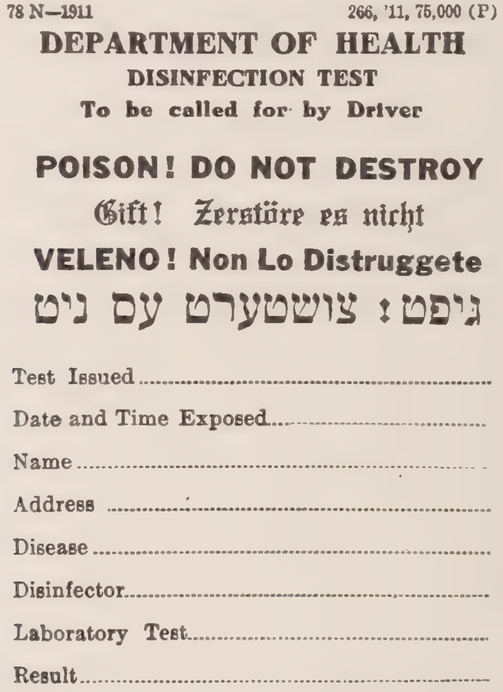
Studies were begun in 1908, with a view of obviating those drawbacks. Comparisons were made as to the advantages of envelopes as compared with the cardboard folders for holding the test threads. About 30 different kinds of envelopes were tried, varying in size, form, position of opening, and quality of paper, the latter ranging from tissue to manilla, glazed, unglazed, etc.

An oblong envelope 4¼ x 3″ made of the quality known as French White tissue paper was finally decided upon as affording the best protection from accidental contamination while at the same time, not interfering with the action of the disinfecting gas upon the threads. (See figure two.)

The next step after the choice of the envelopes, was to find some way of obviating the frequent loss or destruction of the tests by foreigners, unacquainted with their importance. For this purpose, the words "Poison, do not destroy" were printed on the outside of the envelopes in large red letters in four different languages. This method of printing has proved so effective that comparatively few tests are now lost or carelessly destroyed. All other necessary data were printed in black ink.

Modification of Medium. Owing to the inhibiting effects produced upon the organisms when these were not entirely killed by the disinfecting gas, four or five days were required for the color to develop in the broth medium used. Attention having been directed to the results obtained by Sullivan, Frankel & Vosges and later by Ayer in the color production by bacteria on synthetic media, studies in this direction were begun in 1908.

Numerous experiments were made with many forms of synthetic media containing various combinations of the substances recommended by those men, such as asparagin, ammonium lactate, magnesium, sodium phosphate, sodium chloride, etc.



78 N—1911 266, '11, 75,000 (P)

DEPARTMENT OF HEALTH

DISINFECTION TEST

To be called for by Driver

POISON! DO NOT DESTROY

Gift! Zerstöre es nicht

VELENO! Non Lo Distruggete

גיפט! צושטערט עס ניט

Test Issued ....

Date and Time Exposed ....

Name ....

Address ....

Disease ....

Disinfector ....

Laboratory Test ....

Result ....

Fig. 2.—Tissue Envelope containing Test Thread.

The formula given by Ayer and ascribed to Frankel & Vosges consists of:—

Asparagin	4 grammes.
Sodium Phosphate	2 grammes.
Ammonium Lactate	6 grammes.
Sodium Chloride	5 grammes.

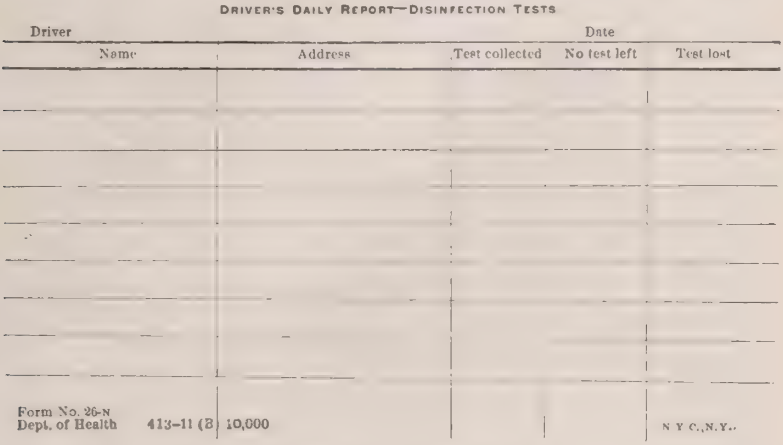
Mix thoroughly and add 1000 c.c. of water.

After trying many modifications of this medium, it was found that it could be improved by the substitution of sodium lactate for ammonium lactate, as the former is more stable. It was also found that better results were obtained after careful neutralization, a point not mentioned by Ayer. The following formula was finally adopted.

Asparagin	4 grammes.
Sodium Lactate	6 grammes.
Sodium Phosphate (Ortho)	2 grammes.
Sodium Chloride	5 grammes.
Water	1000 c.c.

The method of preparing this medium is as follows:—

The salts are finely powdered, and dissolved separately in 50 c.c. to 100 c.c. of water. When thoroughly dissolved, the solutions are added to the remainder of the water and the mixture if necessary is rendered alkaline to litmus by the addition of NaOH. It is then filtered and tubed into $3 \times \frac{3}{8}''$ tubes. After sterilization on two consecutive days in the Arnold Sterilizer, the medium is tested for pigment production by inoculating one of the tubes with the Bacillus pyocyaneus.


DRIVER'S DAILY REPORT—DISINFECTION TESTS

Driver Date

Name	Address	Test collected	No test left	Test lost

Form No. 26-N
Dept. of Health 413-11 (B) 10,000
N Y C.,N.Y..

Fig. 3.—Driver's Daily Report Card.

If properly made the medium is a clear colorless fluid. When inoculated with B. pyocyaneus the color change presents itself in 24 hours time as a clear light green band in the upper portion of the test tube which stands out sharply from the colorless fluid below. This band gradually increases in depth until the entire content of the tube is a bright green. At the end of a week the color loses its clear green tint and becomes yellowish green and muddy. The medium thus gives a vivid color reaction. It was also found to have the added advantages of inhibiting the growth of non-chromogenic organisms.

System Adopted for Controlling Practical Disinfection. While these studies were progressing the following system of testing municipal disinfection was formulated and adopted. The main points of this system are as follows:—

1. An oblong tissue paper envelope $3\frac{1}{2}$ x 4″ containing the test thread and stamped with all necessary indications for data. (See figure 2.)

2. A driver's report card, 3 x 5″ (fig. 3) which is enclosed in a stout manilla envelope and on which is recorded the receipt of the test. (See figure 4.)

3. A disinfector's card 4 x 6″, which when ready for final filling gives a simple complete history of the test from the date of its issue, through its final examination at the laboratory. (See figure 5.)

DEPARTMENT OF HEALTH
NEW YORK CITY
DIVISION OF LABORATORIES
Foot of E. 16th St.

Fig. 4.—Manilla Envelopes in which Tests are returned to the Laboratory.

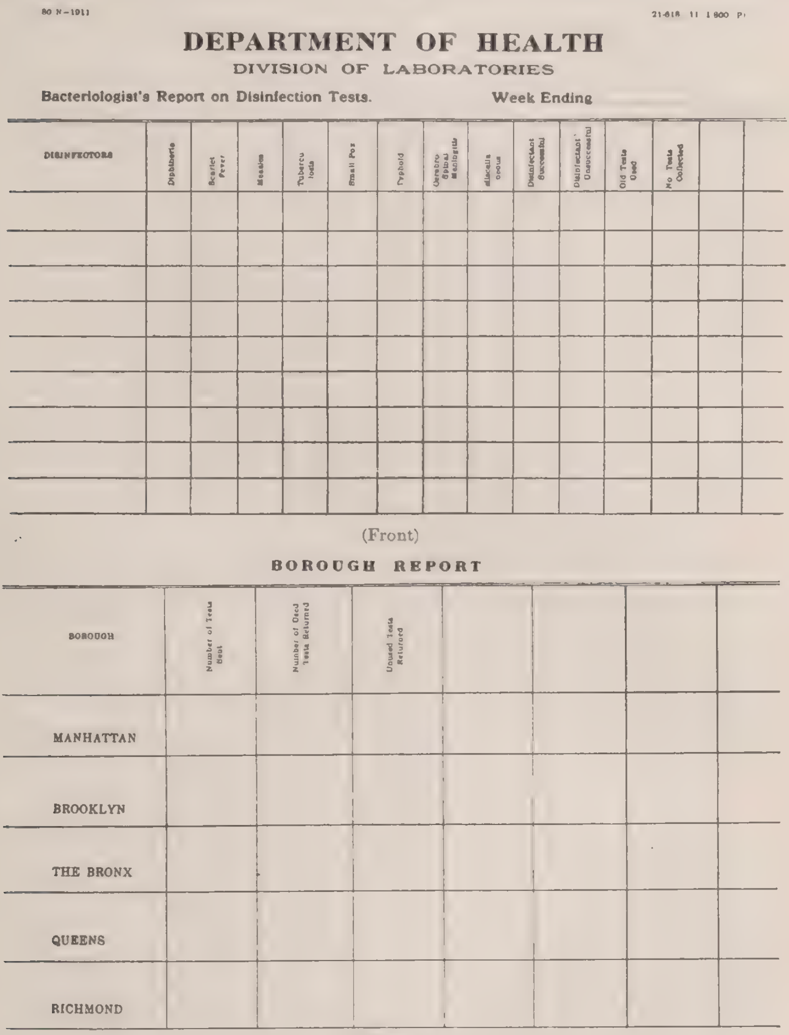
4. A bacteriologist's report (see figure 6) which gives in a concise manner a resumé of the work done by each disinfector during the entire week. These records are kept until the end of the week, and are then sent to the respective boroughs, where they are filed. The test envelope is filed with the case records. The disinfector's card is filed with his record and the Bacteriologist's report, in the Assistant Sanitary Superintendent's Office.

The technique in detail is as follows:—

Number 36 cotton is cut into inch lengths, placed in a Petri dish and covered with a forty-eight hour broth culture of B. pyocyaneus. They are left for two or three minutes or until they are thoroughly saturated, then removed to filter paper in another covered Petri dish and left to dry for 5 minutes, when dry they are placed in the tissue envelopes. (See figure 2.)

The envelope is dated and sealed and sent each day to the disinfector who places it in the room which is to be disinfected, attaching it to the wall by means of its gummed flap.

After disinfection the driver who calls for the bedding, takes up the test, placing it in the manilla envelope (fig. 4) and entering it upon his card.



80 N–1911 21-618 11 1800 P

DEPARTMENT OF HEALTH
DIVISION OF LABORATORIES

Bacteriologist's Report on Disinfection Tests. Week Ending

DISINFECTORS	Diphtheria	Scarlet Fever	Measles	Tuberculosis	Small Pox	Typhoid	Cerebro Spinal Meningitis	Miscellaneous	Disinfectant Successful	Disinfectant Unsuccessful	Old Tests Used	No Tests Collected		

(Front)

BOROUGH REPORT

BOROUGH	Number of Tests Sent	Number of Used Tests Returned	Unused Tests Returned				
MANHATTAN							
BROOKLYN							
THE BRONX							
QUEENS							
RICHMOND							

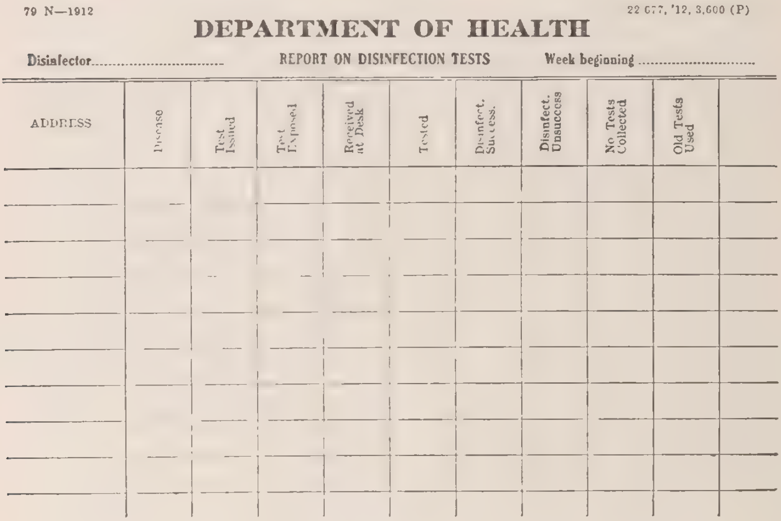
(Back)

Fig. 5.—Bacteriologist's Report.

(See figure 3.) This envelope is then returned to the laboratory where the laboratory where the tests and receipt card are compared and any discrepancy noted. They are also compared with the daily list of disinfections done and checked back in the following manner:—

V—Test received.
X—Test not received,
(X)—Test received late. Noting delay in transmission.

The test envelopes are then stamped with date of receipt, and the threads are removed and placed in the synthetic medium. The tubes are incubated for 48 hours and the color reaction noted, and the results entered upon the test envelopes. Upon completion of this process the envelopes are sorted. They are then entered upon the disinfection cards. (See figure 5.) Account is also kept of the number of tests sent out and unused tests returned. At the end of the week, a Bacteriologist's report is compiled which shows at a glance the work of each disinfector, the number of cases of each disease for which disinfection was performed; the number of successful and unsuccessful disinfections; the number of tests lost, etc. (See figures 5 and 6.)



79 N—1912 22 677, '12, 3,600 (P)

DEPARTMENT OF HEALTH

Disinfector.............................. REPORT ON DISINFECTION TESTS Week beginning ....

ADDRESS	Disease	Test Issued	Test Exposed	Received at Desk	Tested	Disinfect. Success.	Disinfect. Unsuccess	No Tests Collected	Old Tests Used	

Fig. 6.—Disinfector's Report.

Resumé and Conclusions. In conclusion a recapitulation of the method of disinfection and its control, used in the New York Department of Health at present is as follows.

Disinfection of Rooms. This is done by means of the paraformaldehyde and potassium permanganate method. With this method we allow the following amount for 1000 cu. ft. of space, paraformaldehyde 30 grammes or 1 ounce, potassium permanganate 75 grammes or two and one half ounces, water 3 ounces.

The chemicals are put up separately in paste board boxes— the paraformaldehyde is placed in a round straw colored box, 1 3-8″ high and 2″ in diameter, the potassium permanganate is packed into a round black box 1 3-8″ high and 2 1-4″ in diameter. These boxes are then covered with melted paraffine. A small aluminium cup holding exactly 3 ounces of water is also provided together with a small pan, made of black iron. This pan is 4 1-4 inches wide at the bottom, two inches deep and 6 1-4 inches wide at top. (See illustration.)

When the premises to be disinfected are reached, the room is sealed, the disinfection test envelope is hung up at least 6 ft. above and 6 ft. distant from the disinfecting mixture. The contents of one straw colored box and one black box are mixed together in the pan and the 3 ounces of water are added; the mixture is again thoroughly stirred; the door of the room is sealed; and the room is left for 4 hours, when disinfection is said to be completed. The room is then opened and the test is removed and sent to the laboratory. If there is bedding to be removed this is sent to the disinfecting station to be disinfected with live steam.

The Disinfection of Books: the books are opened up so that the leaves are separated; they are then placed in a small steam chamber; and 6 ounces of paraform together with 24 ounces of water and 18 ounces of permanganate of potassium for 1000 cu. ft. is allowed. The heat is regulated so that it remains at a pretty even temperature of about 55°C. and the books are then left until disinfected.

The Control Test of disinfection is done by means of thread infected with a broth culture B. pyocyaneus which is placed in the tissue paper envelopes and then placed in the room or among the articles to be disinfected. Upon conclusion of the disinfection, the tests are collected by the drivers, collecting the bedding and delivered to the laboratory where the bacteriological test is carried out as previously outlined. Then the reports are forwarded to the various divisions.

All these methods have been in use for the past year and have proved satisfactory.

In closing I wish to thank most heartily Dr. William H. Park, General Director Division of Laboratories, for the many helpful suggestions and unvarying and kindly interest he has shown in these studies.

DETAILS OF A FEW OF THE TESTS CARRIED OUT IN THE INVESTIGATIONS

TEST 1

Technique in detail of room disinfection

Paraform	30 grammes	Size of room 1129 cu. ft.
Potassium Permanganate	70 grammes	Length of exposure 4 hours
Water	86 grammes	Bright sunshiny day

The floor made of concrete had just been washed.

Twenty-four hour bouillon cultures of B. coli and B. pyocyaneus were used on cotton threads. Threads were inoculated by immersion in these cultures and then dried on filter-paper. They were then placed in envelopes made of tissue paper, and suspended in the center of room at least 5 ft. distant from the pan. Ten threads of each were used and 5 controls of each organism were made and kept until the room was opened and the envelopes containing the test threads were removed. The test threads as well as the controls were at once placed in tubes of suitable media and the tubes incubated at a temperature of 37° for 3 days; after which readings were made.

TEST 1

Culture	Exp. Threads	Growth	No Growth
B. Coli..................	10	—	10
B. Pyo..................	10	—	10
	Control on above		
B. Pyo..................	5	5	—
B. Coli..................	5	5	

Total number of tests exposed	20
" " " " showing growth	None
" " " " " no "	20:100%.

Under as near as possible identical conditions, this experiment was repeated on August 13th, 15th, and 18th. The humidity was not tested on the 13th, but was respectively 90 and 91 per cent on the last two days. The results were identical with those in the above table. All bacteria on exposed threads were destroyed.

More extended tests where bacteria were exposed in different portions of the room.

Paraform..................	29.23 gms.	Size of room 1129 cu. ft.
Permanganate..............	70 "	2 doors—1 window
Water....................	86 "	Length of exposure 4 hrs.
		Clear day
		Relative humidity 88%
		Entire weight of chemicals 186 gms.
		Weight of residue after test 104.68 gms.
		Weight of entire residue 104.68
		Amount lost in test 81.32 gms.

Loss in weight of residue 32.32 gms.
Amount of formaldehyde in residue .0304 per gm.
Entire amount of formaldehyde in residue 11.25%
Amount of formaldehyde given off 88.75%

In this test the threads were exposed on both cards according to the Wilson Method, and in envelopes according to the method given above. They were also placed in various parts of the room to ascertain distribution of the gas.

How Exposed	Where Exposed	B. pyo		B. coli	
		Growth	No Growth	Growth	No Growth
On cards Wilson Method	On floor 5 ft. distant..........	—	10	1	9
In envelopes	On floor 5 ft. distant.........	—	10		10
On cards	Upon top of closet 6 ft. above and	—	10	—	10
In envelopes	6 ft. distant.....	—	10	—	10
On cards	Upon wall 8 ft. above, 6 ft. distant from pan in left hand corner of room.......	—	10	[1]1	9
In envelopes.........	Upon wall 8 ft. above, 6 ft. distant from pan in left hand corner of room.......	—	10	—	10
On cards	On floor under table between	—	10	[1]1	9
In envelopes...........	closet and wall.	—	10	3	7
Cards	On line center of room........	—	10	1	9
Envelopes..............	On line center of room........	—	10	—	10
Cards..................	On floor 6 ft, distant......	—	10	—	10
Envelopes..............	On floor 6 ft distant..........	—	10	—	10

---

[1] Growth showed on 6th day after test tubes had been accidentally tipped.

Summary of total number of tests

How Exposed	Number	Growth	No Growth
On cards	120	4 = 3.3%	115 = 94.88%
In envelopes	120	3 = 2.4%	117 = 97.6%

1 tube lost.

TEST 6

In this test the penetrative power of the gas was tested and the amount of the chemicals was increased 1-10.

Paraform	33 gms	Size of room 1129 cu. ft.
		1 window, 2 doors
Potassium Permanganate	75 "	Length of exposure 4 hrs.
Water	90 "	Relative humidity 98%

Weight of entire residue 120.98 gms.
Loss in weight of entire residue.
Entire weight of chemical 198 gms.
Amount of formaldehyde given off in test 77.02%
Weight of residue after tests 120.98 gms.
Actual formaldehyde weight 29.70 gms.
43.58 gms.
Amount of formaldehyde in residue 3.48:11.71%
Amount of formaldehyde released 88.29%

How Exposed	Where Exposed	B. Coli		B. Pyoccyaneus.	
		Growth	No Growth	Growth	No Growth
On cards	On line in center of room 6 ft. above, 6 ft. distant from pan.		5		5
Envelopes	On line in center of room 6 ft. above, 6 ft. distant from pan.	—	5	—	5
On cards 1 in fold	On line in center of room 6 ft. above, 6 ft. distant from pan.	—	5	—	5
Blanket pocket in envelopes	On line in center of room 6 ft. above, 6 ft. distant from pan.	—	5	—	5

How Exposed	Where Exposed	B. Coli		B. Pyoccaneus.	
		Growth	No Growth	Growth	No Growth
On cards 2 fold in envelopes	On line in center of room 6 ft. above, 6 ft. distant from pan.	—	5	—	5
In envelopes 2 blanket pockets	On line in center of room 6 ft. above, 6 ft. distant from pan.	—	5	1	4
In envelopes	Near window, 8 ft. above, 5 ft. distant	—	5	—	5
On cards	Near window 8 ft. above, 5 ft. distant	—	5	—	5
In envelopes in 1 fold blanket pocket	Near window 8 ft. above, 5 ft. distant.	—	5	—	5
On cards in 1 fold blanket pocket	Near window 8 ft. above, 5 ft. distant.	1	4	—	5
In envelopes in 2 fold blanket pocket	Near window 8 ft. above, 5 ft. distant	—	5	—	5
	Near window 8 ft. above, 5 ft. distant	—	5	—	5
On cards in 2 fold blanket pocket	Near window 8 ft. above, 5 ft. distant.	—	5	—	5
On cards	In angle formed by closet and wall 5 ft. distant	—	5	—	5
In envelopes in 1 fold blanket pocket	In angle formed by closet and wall 5 ft. distant	—	5	—	5
On cards in 1 fold blanket pocket	In angle formed by closet and wall 5 ft. distant	1	4	—	5

How Exposed	Where Exposed	B. Coli		B. Proccyaneus.	
		Growth	No Growth	Growth	No Growth
On cards in 2 fold blanket pocket...	In angle formed by closet and wall 5 ft. distant..........	3	2	—	5
In envelopes........	On floor in angle formed by closet and wall, 7 ft. distant...	—	5	—	5
On cards..........	On floor in angle formed by closet and wall, 7 ft distant...	—	5	—	5
In envelopes 1 fold blanket..........	On floor in angle formed by closet and wall, 7 ft. distant ...	—	5	—	5
On cards 1 fold blanket.............	On floor in angle formed by closet and wall, 7 ft. distant. ..	—	5	—	5
In envelopes in 2 fold blanket..........	On floor in angle formed by closet and wall, 7 ft. distant ...	—	5	—	5
On cards 2 fold blankets............	On floor in angle formed by closet and wall, 7 ft. distant....	—	5	—	5
Cards.............	Floor near window ...	—	5	—	5
Envelopes..........	Floor near window...	—	5	—	5
On cards 1 fold blanket pocket.......	Floor near window ...	—	5	—	5
In envelopes 1 fold pocket..........	Floor near window ...	—	5	—	5
On cards 2 fold blanket pocket	Floor near window ...	—	5	—	5
In envelopes 2 fold blanket pocket....	Floor near window ..	—	5	—	5

Summary of tests

How Exposed	Number	Growth %	No Growth %	Growth %	No Growth %
On uncovered cards.	50	1	49	2	98
On cards under 1 fold blanket . .	50	1	49	2	98
On cards under 2 fold blanket . .	50	4	46	8	92
In envelopes.	50	—	50	—	100
In envelopes under 1 fold blanket	50	—	50	—	100
In envelopes under 2 fold blankets	50	2	48	4	96

BOOK DISINFECTION

Formaldehyde Alum. Sulph. Lime method and heat—3 hrs. exposure

Amt. of Formaldehyde estimated 40% per 1000 cu. ft. 35 oz.

Size of room—176 cu. ft.

Temperature ranged from 49° to 50° C. for 1 hour and from 50° 51° C. for 2 hrs.

One-half of the tests were incubated at once, the remaining half were kept 24 hrs. to determine death or attenuation of the testing organisms.

Book used.—Vol.—1 560 Page-Board and Linen covers Book open Covers Held Back.
2 193 “ “ “ “ “ “ “ “ “ “
3 575 “ “ “ “ “ “ “ “ “ “

TABLE FOR TEST

Incubated at once

Book Pages	Cond.	Bact.	Growth		No Growth		Doubtful	Total
			Thread	Paper	Thread	Paper		
Vol. 1–560	Open	B. Pyo	2	4	15	13	—	34
	“	B. Coli	6	—	12	18	—	36
2–195	“	B. Pyo	3	2	7	8	—	20
		B. Coli	6	1	4	9	—	20
3–575	Closed	B. Pyo	—	2	8	6	—	16
		B. Coli	—	4	8	4	—	16

Summary

Total number of tests made and incubated at once 142
“ “ “ “ “ “ kept 24 hrs. before incubation 119
Of these incubated at once growth showed in 30:21%
“ “ “ “no “ present 112:79%
“ “ “ kept 24 hours before incubation growth showed in 27:22.6%
“ “ “ “ “ “ “ “ no “ “ in 92:77%

Total number of tests made—261
“ “ “ “ showing growth 57:21%
“ “ “ “ no growth 204:79%

Formaldehyde Alum. Sulph. and Lime method
Amount of formalin (estimated 40%) 44 oz. per 1000 cu. ft.
Range of temperature 49° C. 1-2 hour 55° C. for 2 1-2 hours
Size of room (Steam sterilizer) 276 cu. ft. 3 hrs. exposure
1-2 tests incubated at once, 1-2 kept 24 hrs. before incubation
Books used.
Vol. 1–575 Pages Board and Linen Covers. Covers snapped back open
2–288 “ “ “ “ “ “ “ “ “
3–575 “ “ “ “ “ Book closed
4–210 “ “ “ “ “ “ “

Incubated at once

				Growth		No Growth		
Books	Pages	Cond.	Bact.	Thread	Paper	Thread	Paper	Total
Vol. 1	575	Open	B. Pyo	—	—	10	10	20
			B. Coli	—	—	10	10	20
2	288	“	B. Pyo	—	—	8	8	16
			B. Coli	—	—	8	8	16
3	575	Closed	B. Pyo	—	—	10	10	20
			B. Coli	—	—	10	10	20
4	210	“	B. Pyo	—	—	10	10	20
			B. Coli	—	—	10	10	20
				—	—	76	76	152

Summary

Number of tests made and incubated at once showing growth 1:0.4%
“ “ “ “ “ “ “ “ not “ “ 152:99.6%
“ “ “ “ “ “ “ “ after 24 hrs., not showing growth 132:100%
Total number of tests made not showing growth 284
“ “ “ “ “ showing growth 1:3%
“ “ “ “ “ not“ “ 283:99.7%

Formaldehyde and Lime and Alum. Sulph. Method
Exposure made at room temperature 24 hrs.—Day clear and dry
Amt. of formalin—estimated 40% 18–6 oz. per 1000 cu. ft.
1-2 tests incubated at once 1-2 kept 24 hrs.
Books used. Vol. 1–290 Pages open
2–358 “ “
3–352 “ closed
4–240 “ “

Incubated at once

Books	Page	Cond.	Bact.	Growth		No growth		Total
				Thread	Paper	Thread	Paper	
1	290	Closed	B. Pyo	9	6	3	7	25
2	358	"	B. Coli	7	7	—	7	21
			B. Pyo	11	8	1	4	24
			B. Coli	12	9	1	3	25
3	352	Open	B. Pyo	6	3	4	7	20
			B. Coli	8	2	2	7	19
4	240	"	B. Pyo	6	3	4	7	20
			B. Coli	8	2	2	7	19
				67	40	17	49	173

Summary

Number of tests made and incubated at once showing growth	107:61.84%
" " " " " " " " " no "	66:38.9 %
" " " " " kept 24 hrs. before incubation	
" " " " showing growth	66:46.52%
" " " " " no "	53:54.8 %
Total number of tests made showing growth	174:54.8 %
" " " " " " no "	142:44.1 %
Total number of tests made	317:100

Experiment with dry heat

In this experiment heat alone was used, the books being placed in a steam sterilizer and subjected to dry heat

The length of exposure was 3 hrs.

The temperature varied from 48° to 55° C.

Books used Vol. 1 Pages Books opened covers held back
2 " " " " " "
2 " " closed board and linen covers

Incubated at once

Books	Pages	Cond.	Bact.	Growth		No growth		Total
				Thread	Paper	Thread	Paper	
1		Open	B. Pyo	11	14	4	2	31
		"	B. Coli	14	16	1	0	31
2		Closed	B. Pyo	2	6	6	2	16
		"	B. Coli	5	7	3	1	16
3		"	B. Pyo	3	8	6	1	18
			B. Coli	4	6	5	3	18
				39	57	25	9	130

Summary

Number of tests incubated at once showing growth 96:75.87%
" " " " " " " no growth 34:26.5 %
" " " kept 24 hrs. before incubation showing growth 46:61.97%
" " " showing no growth 37:20%
Total number of tests made showing growth 169:68%
" " " " " " no " 79:31%
Entire number of tests made 248:100%

This experiment was repeated with similar results.

In this test the books were exposed to heat alone, the exposure being made in steam sterilizer, and the books subjected to dry heat. Length of time of exposure was 23 hours.

Temperature ranged from 50°–55° C. 1-2 tests incubated at once
1-2 tests kept 24 hrs. to determine attenuation

Books used
Vol. 1 Pages
1 Open covers held back
2 575
3 575 Board and linen covers closed
4 356 " " " " "

This resulted in death of testing organism but the books were warped and showed the result of long continued heating.

Books	Pages	Cond.	Bact.	Growth		No growth		Total
				Thread	Paper	Thread	Paper	
Vol. 1	210	Opened	B. Pyo	—	—	8	8	16
			B. Coli	—	—	8	8	16
2	575	"	B. Pyo	—	—	8	8	16
			B. Coli	—	—	8	8	16
3	575	Closed	B. Pyo	—	—	10	10	20
			B. Coli	—	—	10	10	20
4	"	"	B. Pyo	—	—	12	14	26
			B. Coli	—	—	13	13	26
				—	—	77	79	156

In this test a new book was used to ascertain the action of heat upon the paper and binding. It was exposed for a period of about 2 1-2 hours at a temperature of 55°C. and beyond a slight spreading of the leaves showed no damage.

A TITANIC PARALLEL

Hugh Arbuthnot Brown, M. D.
Washington, D. C.

Before the horror of the *Titanic* disaster has been entirely forgotten, it may not be amiss to call attention to the vast number of preventable deaths which take place about us every day—deaths to a large extent no less due to lack of preparedness on our part than were the deaths of those unfortunates who went down with the *Titanic* due to lack of preparedness on the part of the steamship company. In each case, however, in the last analysis the fault lies with the countries whose inadequate or poorly enforced laws permit such a wholesale slaughter of innocent victims.

In the case of the *Titanic*, life boats were available for only about a third of the complement of officers, crew, and passengers, and as a consequence the remainder were left to drown or succumb to the icy cold of the North Atlantic. The lack of "life boats" in the way of proper facilities for the preservation of health and the prevention of disease is the cause of the majority of the thousands of deaths occurring every year from such diseases as tuberculosis, typhoid fever, diphtheria, and diarrhoea and enteritis among infants—to mention specifically only four of the most prominent diseases of a largely preventable nature.

As with the *Titanic* the iceberg was the actual, although unseen, cause of the disaster which snuffed out the lives of approximately fifteen hundred men, women and children, so the tubercle bacillus in tuberculosis, the Klebs-Loeffler bacillus in diphtheria, the bacillus typhosus in typhoid fever, and the various pathogenic micro-organisms in diarrhoea and enteritis are the agencies, invisible to the naked eye, but none the less deadly, which year after year continue unnecessarily to take their toll of lives.

The *Titanic* followed the extremely dangerous northern route at a season of the year when icebergs might reasonably be expected to be encountered, and even after these menaces to safe navigation had been reported in the steamship lanes. Similarly, many of us daily take needless risks in countless ways bearing more or less directly on the question of our personal health, as, for example, by the use of polluted water, of common drinking utensils, of unripe or contaminated fruit and vegetables, or by heedless exposure to contagious diseases.

On the other hand, as the utilization of one of the latest marvels of electrical science was undoubtedly the direct cause of saving from the sea most, if not all, of those who were rescued from the *Titanic*, so we have at our command the latest serums, bacterins, and antitoxins, together with other advanced methods of prophylaxis and cure, to meet the hordes of disease-producing organisms and prevent their abnormal development in the body.

The shock of a *Titanic* disaster resounds the world around; for weeks our newspapers were filled with accounts of the terrible and wholly unnecessary loss of life. The lurid headlines are read and discussed in the homes of the wealthy, in the crowded tenements of the poor, in hundreds of dust-laden factories and mines, and in the quiet of the secluded farm. Yet how many of all these thousands, who had no direct connection with the tragedy except the common bonds of horror at the needless sacrifice and sympathy with the bereaved, stopped for a moment to think of the ruthless slaughter taking place about them every day?

In 1910, the latest year for which official figures are available, and confined to what is known as the "registration area," comprising 58.2 per cent. of the population of continental United States, there were no less than 86,309 deaths from tuberculosis, or an average of over 235 a day. In the entire United States it is safe to say that there were fully 150,000 deaths during 1910 from this disease alone, or over 410 every day in the year. In other words, every four days more persons died in the United States from tuberculosis than were lost when the *Titanic* received her death blow.

During the same year and in the same limited area 54,266 children under two years of age died from diarrhoea and enteritis. Here again, in the United States as a whole, fully 95,000 children succumbed to this disease of hot weather, poor food, and crowded and insanitary surroundings—the death toll of the *Titanic* repeated every six days. Approximately 25,000 deaths occurred as a result of typhoid fever and another 20,000 from diphtheria. Here then is combined a loss of 290,000 lives during one year alone, or at the rate of nearly 800 every day, from only four of the largely preventable diseases. One hundred and ninety *Titanic* disasters would barely equal this annual sacrifice.

Now let us look at the matter from a purely mercenary standpoint. Professor Irving Fisher, of Yale University, estimates that in the case of tuberculosis alone "the gross loss of earnings by illness and of potential earnings cut off by death, together with the expenses of illness, etc., amount to over $1,000,000,000 per annum," the loss to consumptives themselves amounting to over $660,000,000, and to the community to $440,000,000. Professor Fisher believes that "at least three-fourths of these costs are preventable," The annual cost of typhoid fever in the United States has been estimated by Dr. George M. Kober at $350,000,000, and that of malaria, by Dr. L. O. Howard, of the Department of Agriculture, at $100,000,000.

Professor Fisher further asserts that "the actual saving annually possible in this country by preventing needless deaths, needless illness (serious and minor), and needless fatigue, is certainly far greater than one and a half billions, and may be three or more times as great."

Notwithstanding the present great loss of life and of earnings from tuberculosis, typhoid fever, diphtheria, and diarrhoea and enteritis alone, the problems of saving and prolonging life through prophylactic measures are being attacked with greater and greater vigor every year, with resulting decrease in the death rates of practically all preventable diseases. Thus, in the case of tuberculosis, the annual average death rate from 1901 to 1905 was 193.2 per 100,000 population in the registration area. In 1910 the rate had decreased to 160.3. In other words, if the average rate for the five-year period 1901–1905 had obtained in 1910, there would have been 104,026 deaths from tuberculosis in this area instead of the 86,309 which actually were reported, a saving of the lives of 17,717 persons from this one disease. Similar results have been attained in practically all diseases of a more or less preventable nature, decreases in the death rates during the past ten years appearing in substantially all cases, due to a large extent, if not wholly, to advanced methods of dealing with our great health problems.

Much of course still remains to be done in the matter of health education on the part of the public, as well as in increased effort by national, state, and municipal health officers and physicians to efficiently enforce existing health laws and regulations and to secure additional and more comprehensive legislation where needed. Although the millennium is not yet at hand, when all diseases of a preventable nature will actually be prevented and man will succumb only to accident or old age, certainly during the last fifty years there has been an improvement in the health of the nation decided enough to warrant the hope and belief that, with improved facilities for preserving health and warding off disease, and increased knowledge of the science of health preservation on the part of the public at large, an approximation at least of this Utopian condition may ultimately be attained.

A DEVICE FOR KEEPING GARBAGE CANS IN PLACE

M. E. Connor, M. D.,

General Inspector, Department of Sanitation, I, C, C, Ancon, C. Z.
Some time Health Officer, Colon and Cristobal

Read before the Municipal Health Officers' Section, American Public Health Association, Havana, Cuba, December, 1911

In the early days of sanitation at Colon and Cristobal, it was somewhat of a problem to keep garbage in the cans provided by the Sanitary Department for the purpose; principally, I suspect, because the inhabitants of Colon and Cristobal had always been in the habit of throwing their garbage broadcast, and the standard garbage cans furnished by the Sanitary Department were somewhat of a novelty and treated as such for a long time.

After we finally succeeded in getting the inhabitants to put at least some of the garbage into the cans, it was another problem to have the covers placed on the cans until the time of collection, which were made twice daily. The garbage cans from the beginning were the favorite haunts of horses, dogs, etc., for subsistence, and in their efforts to get at the contents of the cans, they invariably knocked them over, and those that were not knocked over by the animals were turned over in sport by children and loafers.

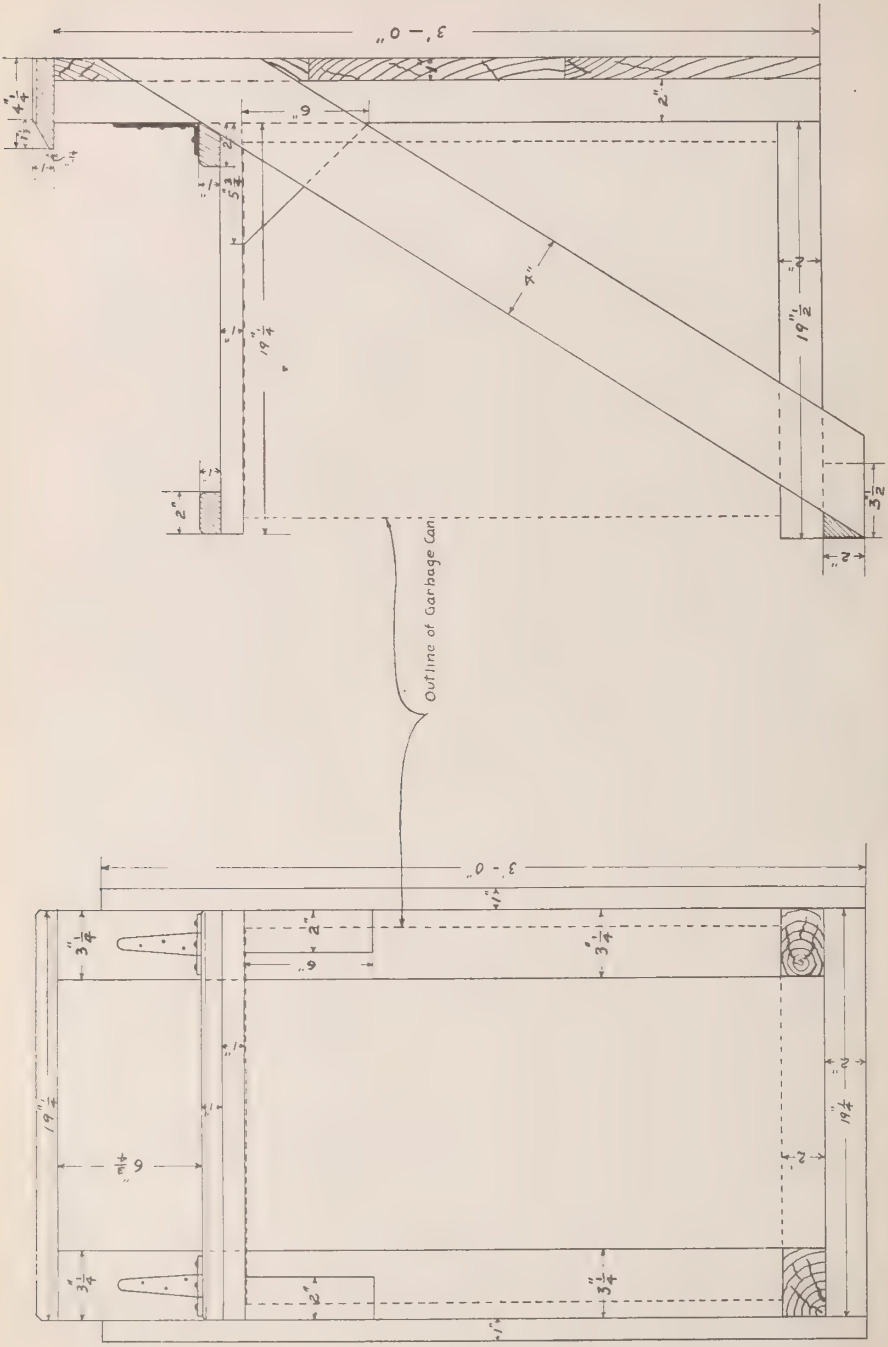
The Department of Sanitation furnished from the beginning the standard galvanized iron garbage cans of the following dimensions: 19″ x 36″: with covers;—these covers might just as well have never been sent us for use in Colon and Cristobal for all the good they did in keeping the cans covered. At Cristobal are located the laborers' camps accommodating about 1500 West Indian laborers. This camp was for single men, but they were allowed to do their own cooking; and it was necessary to supply a sufficient number of garbage cans to meet the requirements of each building that went to make up the camp. The policy of the Department was to place the cans where they would be of the greatest use to the greatest number and, at the same time, be convenient for access of collection. This location at Camp Bierd was at the foot of the steps leading up to each house.

Frequently the garbage collector would find the garbage strewn all over the surface of the ground and the can kicked under the building or into some out-of-the-way place where it was of no service whatever as a garbage receptacle. Wet garbage strewn over the surface is a magnet for flies and vermin of all kinds and especially on the Isthmus where the rainfall is heavy. Grease and other liquid garbage naturally saturated until it reached the level and finally piled up on the surface of the ground, so that there would be a solid mass of three or four, possibly five inches of ideal fly material, in which— after a few hours maggots could be found in large numbers. To avoid this and to assist in keeping the camp clean, it was absolutely necessary that some device be made for keeping the garbage in the cans and the cans in place, and to this end the "self-closing garbage can stand," as shown in the accompanying photograph, was gotten up and put into use in the laborers' camp. The object of the stand was to make the garbage cans fly- and rat-proof and to furnish a self-closing cover. A stand made according to the accompanying blueprint will accomplish this in a satisfactory manner and is proof not only against flies and rats, but will prevent horses, dogs, cats, and other animals from gaining access to the contents of the can. When the stands had been in service in the laborers' camp for a period of eighteen months and had given entire satisfaction during this period, in addition to improving the appearance of the camp considerably and causing the garbage can to remain in one place at all times, it was noticed that the laborers did not bother the cans, for when placed in the self-closing stand and located at a point convenient of access to the occupants of the barracks, as well as the collector, the laborers rather liked the idea of raising the cover and throwing garbage into the can just to see the cover fall back in place without any effort on their part.

As stated above, after the stands had been in use in the camps for some time, it was thought advisable to extend their use to the city of Colon where similar conditions prevailed. The same class of people, West Indians, lived in both places, and consequently our troubles with these cans in the laborers' camps was repeated in Colon. The stands were installed on every house in the city of Colon at the expense of the house owner, and later it was made obligatory for every house owner to furnish a sufficient number of garbage cans and self-closing stands to meet the requirements of the occupants of his house, this number being determined by the Sanitary Department after observation for a sufficient period of time to gage the amount of garbage produced by the occupants of the building. These stands have now been in use in Colon and Cristobal for nearly three years and, during all that time, have given satisfaction in every respect and have solved the problem of keeping garbage cans in place.

Conclusions.

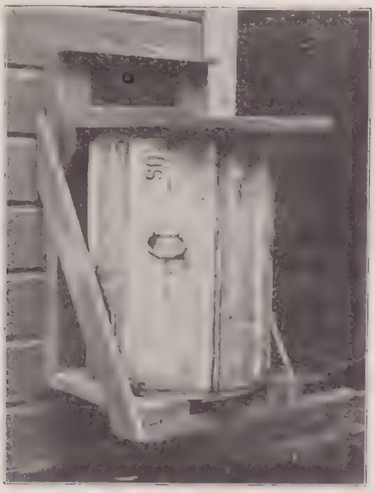
First;—This self-closing garbage can stand furnishes a cover that cannot be taken off easily and thrown away, as can be done with the cover furnished with the standard garbage can.



Self-closing Stand for Garbage Can.

Second;—When made to fit the can, it provides a perfectly fitting cover which does not admit of the entrances of flies, rats, etc., to the contents of the can.

Third;—The stand can be placed up off of the ground, as shown in the accompanying illustration, at some point convenient of access to the occupants of a house and the collector, and is thereby out of reach of children and others who have a habit of knocking over garbage cans when they are placed in alleys or on sidewalks or in patios.



Self-closing Garbage Stand.

Fourth;—With the self-closing stands, the garbage can is placed out of reach of dogs and horses which in this country have to be reckoned with, as these animals depend to a great extent for their subsistence on refuse wherever found.

Fifth;—The cost of making the stand is reasonable;—the Health Office at Colon and Cristobal furnished all of them used in Colon and Cristobal, some 2,000 in number, at a cost of $1.29 U. S. C. per stand. This figure includes the making of the stand and its installation on the building.

TUBERCULOSIS AND QUARANTINE

DR. ALFREDO G. DOMINGUEZ
Third Health Officer of Port of Havana, Cuba

Read before the American Public Health Association, Havana, Cuba, December, 1911

The attention of all the governments is today fixed on the tuberculosis campaign, and their efforts are directed against this disease, which is no doubt one of the greatest calamities suffered by mankind. Notwithstanding this fact, nothing has been done against the travelling tuberculous person who carries the infection all over, spreading the germ on board ship and among his fellow passengers, who are in most cases, ignorant of the great risk they are running.

Dr. A. H. Doty, Chief of the Quarantine Service of the Port of New York, and an authority in that matter, has just published a book entitled "Infectious Diseases and their Prevention," and in order to classify the quarantinable diseases, he divides them into three groups or classes. In the first he includes: cholera, smallpox, plague, yellow fever, and typhus fever, known throughout the world as quarantinable diseases. In the second he groups, diphtheria, scarlatina, measles and varicella; and in the third the other infectious diseases such as typhoid fever, tuberculosis, etc. Referring to the latter group he states "although the latter group are not as readily transmitted from one person to another as are diseases of the first and second classes nor subjected to such definite quarantine regulations, it is necessary that some means be taken to prevent their extension."

All over the world but in our country especially, the tuberculous have no other means of leaving the territory, than by ships, and we the Quarantine Doctors are well aware of the great number of afflicted Cubans and foreigners, that continuously and especially during the summer months, leave the country in search of pure mountain air in order to obtain a cure or relief. A tuberculous patient except in the most advanced state, can always easily sail without any restrictions especially if going as a first-class passenger. Once on board he mingles with the rest of the passengers as if he were a healthy individual, takes his meals at the same table, drinks out of the same glasses used by the public, and his berth and stateroom is again used by somebody else, there being no law that compels the ship to fumigate and paint it.

With reference to the 3d class passenger I can state that many Spaniards and Cubans suffering with the disease, sail in summer, generally during the months in which the steamers are most crowded, under the worst of hygienical conditions, spitting on the floors, and spreading the infection in various ways to their fellow passengers.

We take great care and pay a great deal of attention to the isolation of the patients suffering from other quarantinable diseases; and nevertheless allow the tuberculous to mingle freely with their fellow passengers and under the most favorable conditions to spread the disease. Just think of what 3d class accommodation means; without an opportunity of having the sun rays enter to exercise their germicidal action, without any ventilation, and with a great congestion of people under the worst possible conditions.

This state of affairs is very serious and it is absolutely necessary that something be done to terminate it, and protect the travelling public.

When a case of smallpox, plague, cholera or typhus appears on board, the patient is isolated, the place occupied by him fumigated, and the persons most in contact with him are subject to strict observation. If it happens to be smallpox, we vaccinate or re-vaccinate all the passengers, and those considered not immune are kept in quarantine for 14 days. Nevertheless well known tuberculous patients travel freely, eat at our sides spreading the germ through their saliva on our foods, infect the glasses from which other persons and children drink and may even kiss children unlucky enough to be their fellow passengers, and offer fruits and candies infected by the touch of their infected hands.

It is about time that this state of affairs be stopped by means of proper legislation. I do not suggest that the tuberculous be prevented from travelling but that the Congress take the necessary steps to regulate them during travel. Every tuberculous person known as such, if he be a 3d class passenger should be compelled to travel in the ship's hospital or in a special part isolated from the rest of the passengers. If he be a first class passenger he should be obliged to take an entire stateroom and take his meals in it. If the passenger cannot afford an entire 1st class stateroom he should travel in the hospital of the ship. The captain and surgeon of the ships should be compelled to report the case or cases of tuberculosis on board to the Quarantine officers at the port of destination. These officers should order the disinfection of the hospital, stateroom or other place occupied by the sick passenger, and require the painting of the same if considered necessary.

The above measures could easily be carried out and thereby the possibility of secondary infection avoided. It would be interesting to know how many cases of tuberculosis are caused by infection on ship board, either by contact or room infection.

American Journal of Public Health

Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. AUGUST, 1912. Number 8

$2.00 a year. 20 cents a copy.
Livingston Farrand, M. D., Editor. Selskar M. Gunn, B. S., Managing Editor
Philip P. Jacobs, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

THE WEAK SPOT IN THE SANITARY CHAIN

Every now and then it is borne in upon the sanitarian that in spite of the wonderful additions to sanitary science since 1880, and in spite of improved organization of boards of health, better inspection service, better laboratory facilities, more highly trained medical men and a sympathetic and intelligent appreciation of his work on the part of the public, somehow or other the sanitarian's millennium seems almost as far off as ever.

A recent British Government publication, entitled "Extracts from Local Government Board Reports upon Sanitary Administration in Certain Urban and Rural Districts" brings these facts forcibly to mind as being true even in the country which was the first to begin sanitary reforms and has always been one of the most enthusiastic in supporting and advancing them. The document begins with an introductory note stating that the "Extracts" in question were taken from the Annual Reports of the Board and published in response to a request made to the Chancellor of the Exchequer in the House of Commons November 9, 1911, during a discussion of the National Insurance Bill dealing with "Excessive Sickness." In referring to these reports the Chancellor of the Exchequer stated:—

> "What are the main complaints of these (Friendly) societies with regard to these extra causes of ill-health which add to their pecuniary benefit? Bad drainage, bad water supply, bad housing, factories and workshops not in accordance with the condition of the law, and the offenders are local authorities and private individuals We have had years of Public Health Acts in this country; we have had Local Government Inquiries without number; we have had recommendations of Medical Officers of Health, and of Inspectors of the Local Government Board. I shall be able to prove that they are absolutely helpless in hundreds of cases, and have been for years, not because the Local Government Board has neglected its duty. On the contrary, any one who peruses their reports will see how very concerned they have been about this for years. It is purely because they are armed with the clumsiest, trustiest weapon in the whole army of British law—the mandamus, a perfectly worthless weapon." (Parliamentary Debates, House of Commons, Thursday, 9th November 1911, Vol. 30, No. 143.)

Next follow certain abstracts of inspector's reports each dealing with the "ground of inquiry" and the "chief facts reported by the inspector."

Even brief perusal of these abstracts is sufficient to show that all over Great Britain, nearly a century after Chadwick and Simon and Farr and Kingsley and others did their work, there still remain innumerable examples of bad housing, bad water supplies, bad sewerage, bad milk supplies, bad scavenging, a deficiency of hospital disinfection, in short, thoroughly insanitary conditions generally.

The fact is that in sanitation, as Dr. J. S. Billings long since remarked "we know far better than we do." But what are we going to do about it? Clearly if we would avoid disappointment we must first follow Matthew Arnold's admonition and avoid "nursing any extravagant hope." We must in the next place paraphrase again the words of the same scientific poet of the Nineteenth Century and try to "see our problem and see it whole,"—that is to say, to see its difficulties and drawbacks, as well as its benefits and successes. Above all, we must learn to be patient, not expecting to make the world over in a day or a decade but determining nevertheless to keep everlastingly at our work, believing that in the long run we shall do away with most of the remediable ills which now afflict mankind, and that we shall meanwhile make life cleaner, sweeter, happier, and very likely longer.

The Chancellor of the Exchequer appears to think that better legislation would enable the sanitary authorities to effect all necessary reforms. This is undue optimism. In America at least, the people are usually better led than driven, and it is more than doubtful whether better laws would meet the situation even in England. Education, like law, can do much, but time and patience must be mingled with law and education, probably for a long time to come, before ideal relations will be reached, or even approximated.

ALL ABOARD FOR WASHINGTON

The Secretary of the American Public Health Association states that the outlook for the annual meeting is very bright. A large number of members have already announced their intention of being present and a strong program has been arranged. With the XV International Congress occurring the week following the meetings of the A. P. H. A., the opportunity is such an extraordinary one that it is confidently expected that the attendance records of the past are going to be smashed. The Association will make a fine showing before the public health workers of the world.

PASTEURIZATION OF MILK WITH SUGGESTIONS AS TO METHODS AND APPARATUS TO BE EMPLOYED

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This article is not for the purpose of entering into any extended or elaborate scientific description of the value, or otherwise, of the pasteurization of milk; nor is it intended to recommend any specific equipment or apparatus to be employed in its pasteurization. It is prompted by a desire to indicate, in a general way, the reasons why the Department of Health favors the pasteurization of milk; to state the results which it is desired shall be obtained; and to show the advantages and disadvantages of the different methods and apparatus which are employed, as has been shown by the experience of inspectors in observing and testing the apparatus while in actual use.

Inquiry is frequently made by milk dealers as to "what the Department wants" in the pasteurization of milk, and in the absence of any tabulated information on the subject, or any available book, which deals in a practical way with the subject, the dealers are much at sea; and frequently each one is obliged to work out the prob.em himself, and arrives at his conclusion by what are sometimes costly experiments. This article is an attempt to help the milkman solve his problem.

The application of heat in order to preserve food stuffs has been employed for an unknown length of time.

About 1782, a Swedish Chemist, Scheele, discovered that vinegar could be preserved against spoiling by heating it; and not long after this others began to preserve fruits, vegetables, milk, etc., by heating them in enclosed vessels. Not until 1870, however, did Louis Pasteur, in his studies of the causes of deterioration which took place in wines and beers, discover that the heating of these products destroyed certain forms of life which gave to the liquors bad flavors, etc. which he termed "diseases." He found that by heating to a temperature of 158 to 176 degrees F. and holding the fluids at this temperature for a period of time these "disease germs" as he called them, were destroyed, and the quality of the wines and beers improved. In consequence of this valuable discovery, the heating of wines and beers became very generally practiced in Europe and the process was termed "pasteurization" from the name of the man who originated it.

In Denmark, the process of heating was applied to milk, for the purpose of destroying germs, especially in order to improve the flavor and quality of the butter produced in that country; and later, also in order to assist in the elimination of tuberculosis among cattle, it being required that all skim milk from butter factories be pasteurized before being fed to calves, swine, etc.

In this country, the destruction of bacteria by boiling milk to be used for infant feeding was strongly recommended in the 70's by Dr. Jacobi, an expert on infant feeding. The heating of milk which was to be used in its fluid state for market purposes, was at first employed by milk dealers for the purpose of preventing or delaying the souring in milk due to the fermentation produced by the enormous number of germs in milk which had previously been so badly handled or so insufficiently refrigerated, that it would otherwise be unmarketable, and thus become a loss to the dealer. In consequence of the faulty methods employed and the purpose of the dealers, Health authorities at first looked upon the pasteurization of milk with disfavor, because it was considered to be a make-shift and a means of covering up bad practices in its production and handling. Fuller consideration on the subject of milk control, however, made it evident that it was practically impossible to procure for the entire milk supply of large cities a safe, raw product. This fact at length induced food experts to favor the pasteurization of milk as a safeguard against dangerous infection. This idea has been largely strengthened by recently discovered knowledge that milk may become infected by germs of certain diseases without those persons responsible for the production and handling of milk knowing that such infection was taking place. It has been discovered that persons may be, and often are infected with the typhoid bacilli, and that they are what are known as "typhoid carriers," without themselves knowing that they are thus infected. In certain instances also, persons who do not know that they are infected with diphtheria or other communicable diseases may handle the milk and thus infect it. A recent fatal epidemic of septic sore throat which occurred in Boston, and in which over 2000 persons were made sick, was traced to infected milk. In addition to these facts it has been demonstrated that a considerable number of children die from tuberculosis which is of bovine origin, and it is also certain that many who recover from diseased glands of the neck have tuberculosis of this type. It is now certain that this infection enters the body through the milk used as food. This makes it important that the milk which is used by children shall be free from tubercular infection.

It has been demonstrated that when milk has been heated to a temperature of 140 degrees and held thereat for twenty minutes, all of the disease producing bacteria are killed; also, that if milk is heated to a uniform temperature of 158 degrees for one minute, all such disease germs are killed. In view of the fact, however, that in most commercial processes of pasteurization the temperature is likely to, and does fluctuate, it is necessary to insure that all parts of milk will get the full temperature required. This is accomplished by holding the hot milk for a known length of time in order to equalize the temperature. The period of time for holding milk at a temperature of 158 degrees has been officially fixed by the New York Board of Health as three minutes, or at 140 degrees for twenty minutes. Between these extremes of temperature, varying degrees of heat with corresponding varying lengths of time for holding at these temperatures have been decided upon by the Board of Health as follows:

No less than 158 degrees F. for at least 3 minutes.
No less than 155 degrees F. for at least 5 minutes.
No less than 152 degrees F. for at least 10 minutes.
No less than 148 degrees F. for at least 15 minutes.
No less than 145 degrees F. for at least 18 minutes.
No less than 140 degrees F. for at least 20 minutes.

It has been found that milk which has been heated to an excessive degree, say 160 degrees or over, has some of its constitutent parts changed, and is somewhat injured as an infant food. As the temperature rises above 160 degrees these changes begin to occur and take place to an increasing extent as the heat reaches the boiling point. The milk sugar becomes somewhat scorched; the casein and albumin are hardened; the calcium, magnesium and phosphoric salts are partially precipitated; and the digestibility of the milk is impaired. There is also this commercial objection, viz: that in milk which is heated and held at high temperature, the cream will not rise as well as if it is unheated, and what is known as the "cream line" is interfered with. As heating at lower temperatures for the required time has all the advantages and none of the disadvantages of heating at higher temperatures it is to be preferred.

Milk which contains an excessive number of bacteria contains as a product of their growth a quantity of acids and other undesirable substances, and may contain also dangerous poisons. These are only partially destroyed by even a boiling temperature and it is thus desirable that the milk which is to be pasteurized shall, before heating, be as free as possible from bacteria.

The pasteurized milk which New York health authorities consider to be the safest and which they desire shall be produced for use in New York City is milk which in its unheated state, did not contain an excessive number of bacteria, and which when heated is subjected to a temperature which destroys all disease producing bacteria and a large percentage of bacteria of all kinds; also, that all such milk have its constituent parts as little altered by excessive heating as possible.

In order that Health authorities may be assured that these desired results are obtained in milk which has been commercially treated, two general methods of control are open. One method is to judge of the effectiveness of the apparatus used by means of the chemical and bacteriological conditions which are found to exist in the pasteurized milk which is under examination; the other method of control is to make sure by inspection and tests that the apparatus and equipment in use are proper and efficient and are working as nearly automatically as possible. If these conditions are satisfactory authorities can rest assured that if the apparatus is properly used the results obtained will, of necessity, be satisfactory, and that the finished product will respond to whatever bacteriological or chemical tests may be applied.

The New York Department of Health considers that the latter method of control is the most feasible and effective with the limited inspectorial and laboratory forces at its disposal, and for this reason insists that the apparatus and equipment used in pasteurization shall be tested and approved, and that automatically made heating records shall be kept on file by the concern pasteurizing the milk, before permits for pasteurization shall be granted. Occasionally bacteriological tests are made in order to indicate if the equipment is being properly used and operated.

Without recommending any particular makes of apparatus which will do good work, it may be said that an ideal system of pasteurization would be as follows:

First: The various stages in the treatment of the milk should be carried on in separate, clean, well-lighted and ventilated rooms or compartments.

Second: There should be as little piping as possible and the use of pumps should be avoided after the heated milk has entered the holder; also the arrangement of the apparatus should be such that the milk will flow by gravity from point to point in the process of treatment.

Third: In order to prevent superheating the milk the heating should be effected by the milk flowing over a water-heated surface which is relatively large for the amount of milk heated, and which is automatically kept at a temperature not over 15 degrees higher than that at which it is desired to heat the milk. This heating surface should be heated by contact with hot water; no live steam should strike this heating surface. The water should be heated in a tank outside of and separated from the pasteurizer and kept by means of a thermostat at a uniform temperature, and then injected into the pasteurizing machine. The speed of flow of the milk through the heating apparatus should be regulated by means of a thermostat placed in the outflowing hot milk. This particular means of controlling the milk temperature is not now in use, but it would be undoubtedly an ideal way to control such temperatures and is practicable to use.

Fourth: The temperature at which the milk is heated *must* be automatically recorded and for convenience should be automatically controlled.

Fifth: The holding apparatus whether it be an absolute or a continuous process, should be so constructed as to definitely insure the holding of every particle of the milk without fail for the desired length of time. An automatic temperature recorder is desirable upon the holder.

Sixth: The cooler should be so constructed and arranged that the milk is cooled rapidly to a temperature as near 40 degrees F. as possible, and with no exposure to contaminated air; and the milk should be kept cold until delivered to consumers.

Seventh: The milk, especially after pasteurization, should be protected against contact with any unclean apparatus, or with infected or dust-laden air.

Eighth: The use of rubber fittings or gaskets should be avoided.

Ninth: Containers should be thoroughly and, if possible, automatically washed and sterilized, and stored in an inverted position until filled. The washing and rinsing of bottles by means of jets of hot water has been found to be more effective than jets of steam in reducing the bacteria in bottles. In any washing machine, the last rinsing water should be absolutely fresh, hot water, and as near the boiling point as possible.

As to specific makes of apparatus in use, it is of course not proper to recommend any particular kinds, but it cannot be considered amiss to indicate the advantages and disadvantages of the various kinds as shown by actual experience.

HEATERS.

There are five typical forms of apparatus in use for the heating of milk.

First: The Danish heater which is sold under various names depends for its operation upon the throwing by centrifugal force of a body of milk against the inner surface of a steam-heated cylinder or drum. The chief advantages of this form of heater are its comparatively small cost, and the ease with which it may be cleaned. Its disadvantages are that the heating surface is so small for the amount of milk treated that it is necessary to keep the heating surface at a temperature far above that to which the milk is to be heated. With a fluctuating flow of milk some of the milk is in danger of being scorched and some may not be heated hot enough. A uniform temperature for the milk is difficult to obtain.

Second: Several firms make various forms of heater in which the milk flows between two or more water-heated upright cylindrical surfaces. In each of these some method is employed to keep the milk which flows upward through the heater in rotary motion, thus insuring that all portions of the milk come in contact with the heating surfaces. These machines are effective, those being the most satisfactory in which the greatest amount of hot water is available to heat the milk, thus making it possible to use water which is at a comparatively low temperature. Those forms of heaters which employ the regenerative principle, making use of the inflowing cold milk to cool the outflowing heated milk are only valuable for pasteurizing milk in New York City when it is possible to hold the heated milk for a definite time before returning it to the machine for regenerative purposes. Some machines economize heat by employing the warm water from the coolers for warming the cold milk flowing to the heater. This is a satisfactory method.

Third: The tubular system of heater is made by several concerns. In all these heaters the milk flows through tubes which are enclosed in hot water jackets, the hot water flowing in a direction opposite to that in which the milk flows thus using the maximum heating power of the water and also raising the temperature of the milk gradually to the highest point. This method of heating is satisfactory, those machines being the most efficient in which the flow of milk is slow enough or which have sufficient heating surface to insure that all portions of the milk will reach the maximum temperature. In choosing a machine of this type great care should be taken to secure one which may be easily cleaned, especially at the joints and turns, and one also where there is the least danger of the heating water becoming mixed with the milk in case of leakage. One objection to this form of heater is that owing to the very slight inclination of the pipes from the horizontal, it is very difficult to empty all the milk from the machine when the work is finished for the day. One strong advantage of this type is that it may be very thoroughly sterilized by live steam under pressure if desired after washing.

Fourth: The tank system of heating milk is employed. Such heating tanks are made by several firms. These horizontal tanks are surrounded by water jackets through which hot water is forced. They also have either hollow revolving screws or coils of pipe through which hot water is pumped. In these tanks the milk reaches the maximum temperature rather slowly but the heating may be checked instantly when the desired temperature is reached, and the milk may be held at this temperature as long as desired and the tanks then emptied. The automatic temperature records made when this form of heater is used are most complete and satisfactory. For small milk dealers who wish to pasteurize only the amount of milk which would be contained in one tank this would seem to be a very satisfactory and economical method, since one tank could be used as a heater, holder, cooler and a storage tank. When used as a cooler, cold water or brine takes the place of the hot water in the jacket and screw. There is this objection, however, that the cooling takes place rather slowly unless very cold brine is used.

Fifth: Another process of pasteurizing milk consists of heating the milk in the bottles which have previously been filled with the raw milk and then sealed. These filled bottles are either placed in a tank of hot water or else are subjected to a shower of hot water. After heating and holding for the desired length of time the milk and the bottles are cooled by subjecting them to cold water. By this system the bottle and its cap are pasteurized at the same time the milk is treated, and all subsequent infection of the milk is avoided. This appears to be an ideal method of pasteurizing from the scientific viewpoint. Objections to it are commercial ones, among which may be named the extra expense involved; the necessity of having an air space between the milk in the bottle and the cap to allow for the expansion of milk when heated, which allows the churning or shaking of the milk when handled and the consequent destruction of the cream line; also that whatever offensive odors may be contained in the raw milk have no chance of escape during heating.

HOLDERS.

There are two general methods of holding milk after heating.

First: The *Absolute method.* By this method the heated milk is placed in separate tanks or compartments from which it is automatically released by a mechanical device at the expiration of the time for which it is desired that the milk be held. This method is entirely satisfactory provided that no serious loss of heat occurs during the holding process, and that every particle of milk remains in the holder for the required length of time. In installing a holder of this type milk dealers should select one which is easily cleaned and has the fewest pipes and valves, and is the least likely to get out of order. Also those which develop the least amount of foam while in use are the most satisfactory. Some forms of absolute holders have the tanks surrounded with hot water jackets to prevent the loss of temperature in the milk. While this is satisfactory, it is doubtful whether the extra expense involved in so jacketing the tanks is necessary, provided the holding tanks are so insulated that the temperature will not fall below the maximum heat required. The surface foam is often many degrees cooler than the milk beneath it resulting in incomplete destruction of the bacteria. Some holders are now made in which the tanks are filled from the bottom, thus preventing the formation of foam.

A second method of absolute holding is the use as holders of the tanks in which the milk has been heated. This method has been described under the heading of heaters. (Page 10) This is a very satisfactory method.

Second: The *Continuous method.* By this method the heated milk is so delayed or retarded in its flow toward the cooler that it retains its temperature for varying lengths of time depending upon the efficiency of the apparatus. In all holders of this type it has been found by means of tests made with color solutions while the apparatus was being operated with water instead of milk, that there is a mixing or diffusion of the liquids so that these machines never have 100% of their theoretical efficiency as holders. Three general types of continuous holders are available for use.

(a) The upright cylindrical tank in which the milk enters at the top and flows out at the bottom when the tanks become filled. These tanks are used either singly or arranged in series of two or three or more. Single tanks are seldom satisfactory and are not recommended. Depending upon the manner and form of construction, these tanks have a holding efficiency of from 25% to 50% of their theoretical capacity. One disadvantage of this type, when large, is the difficulty of cleaning.

(b) Horizontal tanks in which cross partitions retard the flow of milk from one end to the other. In the best forms of these tanks, the tests have shown that an efficiency of from 10% to 15% of their theoretical capacity is possible.

(c) Horizontal tubular holders in which the milk flows backward and forward through a series of tubes; the milk entering at the top of the series and being discharged from the lower tube of the series. This form has been found to have an efficiency of from 80% to 85% of its theoretical capacity. The same difficulty in emptying this form of holder has been observed which has already been noted in emptying the tubular heaters. This is due to the very slight incline or grade of the pipes from the beginning to the end of the series. The cleaning of the tubes must be done with great thoroughness.

In any form of holder great care should be taken when in use to have it thoroughly heated with steam before filling with milk since otherwise the first milk passing through the apparatus will lose much of its heat and there will be a failure to thoroughly destroy the bacteria contained in the milk.

COOLERS.

There are three general types of coolers in use.

First: The open cooler where the hot milk flows over the outside of a series of water or brine cooled pipes. In this form of apparatus the temperature is quickly reduced to a low point provided the hot milk is not allowed to flow too quickly and a sufficient number of cooling pipes are employed. The objection to this form is that the milk is exposed to the air unless the cooler is protected by covers, or is located in a separate room, the air of which is free from dust and bacteria. Where covers are provided for such coolers it is rather difficult to thoroughly clean them and keep them clean. It is rather difficult also to sterilize these coolers since in most of them steam can only be thrown against the surface of the cooler and cannot be confined or applied under direct pressure. It might be feasible to provide tight covers for these coolers so that steam under slight pressure could be used.

Second: The cooling may be accomplished in the same apparatus in which the milk is heated or in an apparatus of similar character the hot water having been replaced by cold water or brine. When this method is used the milk is not exposed to the air and there is this advantage also that the apparatus may be thoroughly sterilized by steam.

Third: The tubular heater. In this form the pipes through which the hot milk flows are enclosed in other pipes or compartments through which cold water or brine flows. This method of cooling is effective and the apparatus may be easily and thoroughly sterilized by steam. The difficulty of emptying the milk from these pipes, which has been noted in describing the tubular heater and holder, also is here no evidence.

BOTTLE WASHERS.

The ideal method of washing milk bottles is to first wash them by hand upon revolving brushes and then pass them through an apparatus where they are subjected to the heat and rinsing of hot water and finally to live steam. Various mechanical automatic bottle washers are made by several manufacturers, each of which do good work. Care must be taken, however, to make sure that the final rinsing water has a temperature of at least 180 degrees F. This temperature may be secured either by means of a thermostat attached to the rinsing tank or by using a machine which by its form of construction requires this high temperature in order to become mechanically operative. All bottles after washing should be inverted and kept in this position until the process of filling with milk commences.

It is important that milk, after being pasteurized, shall not become in any way reinfected with dangerous bacteria. The greatest danger of such infection is due to the practice of capping the filled bottles by hand. When this method of capping is used, the caps are frequently kept in open boxes beside the bottling machine, and sometimes in the pockets of the workmen who are employed in capping the bottles. There is thus constant danger of the caps becoming infected either from the air or from the hands of the persons who handle them. Some form of automatic capping machine is extremely desirable and may be said to be a necessity. Various such machines are on the market and are being used to a considerable extent. Those machines are the most satisfactory in which it is possible to use the caps which have previously been kept in sealed and sterile containers or tubes before being inserted in the machine. Those capping machines should be chosen which miss the fewest number of bottles when in actual operation. When a great number of bottles are missed in capping it is necessary to readjust the caps by hand and thus all dangers which are present in the ordinary process of hand capping are also repeated here.

TROPICAL DISEASES IN CUBA

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Read before the American Public Health Association, December 6, 1911, Havana, Cuba

The purpose of this paper, or rather of this note, is to call attenton to an interesting point in the conditions of public health in Cuba, within the past few years, that is, since the time when nationalization of all the sanitary services of the country began to exert its beneficial influence, and especially in regard to so-called Tropical Diseases.

Cuba, on account of its geographical situation within the north tropical zone, with a mean annual temperature of 24 to 25 degrees Centigrade, finds itself in the most favorable condition for receiving, developing and propagating a multitude of diseases peculiar to warm climates; but fortunately this does not occur. Tropical diseases, properly speaking, in the strict sense of the term, may be said not to exist in Cuba at the present time, as I shall endeavor to show in the course of this note.

According to the official census prepared by the Department of Government, the population of the Republic of Cuba, on June 30, 1910, reached 2,220,278, a figure which may be considered below the real number on account of the increase which immigration and natality produce, but which increase has not been fully estimated because it has not been possible as yet to obtain a complete registration of these two sources of growth of the population for causes which we need not enter at present.

The coefficient of mortality in 1910 for the entire Republic was 15.21, and in 1909, 13.03, which shows an increase from one year to the other of 2.18, to be distributed, according to the authoritative opinion of Dr. Le Roy, Chief Statistician of the Department of Sanitation, to the increase in population and especially to natality, and in part also to grippe which caused an unusual number of deaths in 1910.

In spite of the small increase referred to, the annual death rate of 15.31 continues to keep Cuba at the head of the two countries which have the lowest mortality in the world, with an increase in favor of the native population, comparing the figures of births and deaths, of 42,862 inhabitants. Having completely eradicated from Cuba smallpox for a number of years, and yellow fever since December, 1908, which were the scourges causing the greatest havoc and terror to the public health of the island, it is possible for me to say that we have only, as problems to be solved, malaria, tuberculosis and infantile enteritis; three problems, however, which are not directly related to tropical pathology, since these diseases are cosmopolitan and constitute, as is well known, the constant preoccupation of the world.

And yet, malaria has virtually ceased to be a problem for us. In combating the cause of yellow fever by extinguishing the *stegomyia calopus*, we also combat and extinguish ipse facto, the *anopheles*, which are the propagators of malaria, and also the other genera and species of mosquitos which are responsible for other infections. It is possible to affirm absolutely that malaria no longer exists in the city of Havana, and that each year the cases in other parts of the island become rarer. Dr. Le Roy has been able to prove that in 1900 the deaths in Cuba from malaria reached 4,107, a figure which has been steadily decreasing to 617, in the year 1910, for the entire Republic.

In order to control infantile mortality and tuberculosis as far as possible, the Department of Health and Charities of Cuba has been putting into practice all measures which modern hygiene recommends and which experience has shown to be most effective in other countries.

Now let us ask. What tropical diseases are to be found at present in Cuba? As a matter of fact, the nosological classification which is offered us in their respective works by such authors as Corre, Manson, Le Dantec, Jackson and others is with difficulty applicable in the case of Cuba. Reviewing one by one the tropical diseases described by the authors mentioned, we find that only a very few have place in our pathology, especially after the proclamation of the Republic.

The following diseases are unknown in Cuba: trypanosomiasis, kala-azar, relapsing fever, bubonic plague, pellagra, epidemic dropsy, epidemic gangreous rectitis, framboesia, verruga peruana, the ulcerative granuloma of the genitalia, oriental sore, and many other different affections which form the nosological classification of tropical diseases.

It is now many years since we have been visited by asiatic cholera; hemoglobinuric fever is becoming more rare every year; dengue may already be classified as a cosmopolitan disease; Malta fever has not yet been officially recognized as existing in Cuba, although certain cases have occurred which have been classified clinically, though not bacteriologically, as Malta fever; sunstroke is already so rare in Cuba that it is scarcely ever mentioned; beri-beri makes its appearance from time to time in scarce numbers in communities where hygienic precautions are not observed, dysentery decreases so rapidly that only 43 deaths were due to it in 1910; the abcesses of the liver and other affections of this gland are more or less rare; no case of madura-foot has occurred for many years, and likewise no case of ainhum, those which were observed being in subjects of the negro race born in Africa; chappa has not attracted in the past few years the attention, neither have other diseases which no longer have any place among us save in the annals of medical history.

Strictly speaking, the only tropical disease which at present exists in Cuba is filariasis, which is bound to disappear by the contiunous action of combating the mosquito.

The state of public health in Cuba is, without doubt, admirable. And if to this we add, that in the country districts, in the expanse of the plains, in the thickness of the woods, and on the margins of the rivers, the traveler may move and rest in confidence and ease, because he is not threatened by poisonous serpents, nor poisonous insects, nor dangerous animals; it is not too much to say that Cuba is a land of promise which offers to its natives and to foreigners who visit its shores the products and benefits of a privileged soil and the necessary guarantees of health and life.

Professor Le Dantec in his excellent work on Exotic Pathology, on studying the health conditions of the Northern and Southern States of the American Union, establishes the general law, which he considers applicable to all the colonies of the Antilles, which he expresses in the following terms. The warm regions of America are not colonies fit for population by the white race. They are colonies for agricultural exploitation; but they are above all colonies for population by the negro race and half breeds.

The learned professor of exotic pathology of the Medical School of Bordeaux, could not have imagined that, in the course of time, and as the result of sanitary measures which have not yet become general in his country, the island of Cuba would offer to the world an even lower death rate than that of France, and would furnish to white immigrants from all countries more certain guarantees of health than any of the French or other European colonies throughout the world, with the only exception of Australia.

BOSTON'S DEATH RATE

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Boston's death rate for 1911 was 17.1, which is high compared with rates of most other large American cities.

The 1911 rates for the other cities having over 500,000 inhabitants were—Cleveland 13.55; Pittsburgh 14.94; Chicago 14.55; New York 15.22; St. Louis 15.36; Philadelphia 16.51; and Baltimore 18.43.

A brief analysis of these rates is desirable.

Typhoid Fever:—From typhoid Boston had the lowest rate of all the cities. The rates per 100,000 were as follows:—Boston 9.14; Chicago 10.78; New York 10.99; Philadelphia 14.11; Cleveland 14.46; St. Louis 15.56; Pittsburgh 25.81; and Baltimore 27.28.

Scarlet Fever:—The rates were Baltimore 7.79; Pittsburgh 9.95; Boston 10.74; Philadelphia 11.33; New York 13.25; Chicago 21.20; St. Louis 27.26; and Cleveland 31.12.

Diphtheria:—The rates were Baltimore 12.05; St. Louis 16.84; Boston 18.00; Cleveland 21.94; Pittsburgh 23.60; New York 25.84; Philadelphia 31.51; and Chicago 39.11.

Measles:—The rates were Chicago 5.75; Cleveland 6.63; Pittsburgh 9.59; Boston 10.74; New York 13.25; Baltimore 13.63; St. Louis 15.84; and Philadelphia 19.30.

Whooping Cough:—The rates were Chicago 2.45; St. Louis 4.57; Philadelphia 7.34; New York 7.75; Baltimore 8.50; Cleveland 14.80; Boston 15.68; and Pittsburgh 19.54.

Taking all these diseases together, Boston had the lowest rate with 64.30 per 100,000; the others in order were Baltimore 69.25; New York 70.88; Chicago 79.29; St. Louis 80.07; Philadelphia 83.59; Pittsburgh 88.49; and Cleveland 88.95.

Tuberculosis of the Lungs:—The rates per 100,000 were Cleveland 121.77; Pittsburgh 130.88; St. Louis 135.29; Boston 154.88; Chicago 165.98; New York 177.39; Philadelphia 187.31; and Baltimore 205.12.

This analysis of the communicable diseases should be extremely gratifying to the people of Boston. However, it fails to reveal the reason of Boston's higher rate. But a study of the figures for 1910, for which year more complete figures are available, will show much more.

The following rates for 1910 are from Bulletin 109 of the Census Bureau:—

1910—Rates per 100,000

Cities

Cause of Death	Cleveland Ohio	Pittsburg Pa.	Chicago Ill.	New York City	Philadelphia	St. Louis	Boston	Baltimore	Boston 1910 per cent of total deaths non-residents
All causes	1427.2	1793.7	1514.0	1599.8	1739.9	1579.4	1716.1	1921.8	11
Typhoid	17.9	27.8	13.7	11.6	17.5	14.9	11.3	42.0	15
Malaria	0.2	0.4	0.5	0.7	0.5	4.9	0.1	2.0	....
Small Pox	0.4	....	..	0.1	0.3		.	..	...
Measles	17.0	33.1	8.7	14.4	10.6	9.3	14.2	3.6	4
Scarlet Fever	12.6	22.2	18.4	20.0	9.8	27.1	9.2	8.6	15
Whooping Cough	6.6	14.4	7.9	5.9	20.5	8.3	7.6	15.2	2
Diphtheria and Croup	21.3	25.4	37.4	35.6	30.8	16.1	23.9	11.4	6
Influenza	9.0	14.2	6.6	6.1	10.2	18.7	7.6	11.4	10
Erysipelas	5.5	4.1	4.1	6.2	5.1	2.6	8.3	7.3	8
Tuberculosis of Lungs	127.2	104.2	158.3	185.0	193.5	166.7	171.7	228.0	7
Tuberculous Meningitis	10.8	12.5	10.1	17.0	11.8	6.5	21.5	10.2	10
Other forms of tuberculosis	8.5	13.1	9.6	9.0	11.6	11.7	11.4	12.7	3
Rheumatism	10.1	7.7	7.4	8.1	7.8	8.1	6.4	7.0	4
Cancer	73.1	65.6	82.2	78.0	85.0	85.1	104.5	96.2	16
Diabetes	13.3	8.6	15.9	18.6	16.1	12.9	20.8	18.1	6
Meningitis	10.5	13.6	9.7	11.4	7.7	10.9	15.6	22.2	1
Cerebro Hemorrhage and Softening	62.3	65.2	39.1	54.9	75.0	58.2	91.6	91.1	7
Organic Diseases of Heart	102.7	125.9	134.0	137.4	173.1	131.3	201.1	173.7	8
Bronchitis	39.0	52.7	7.8	28.9	33.5	44.5	24.6	30.9	5
Pneumonia	127.3	323.7	240.8	222.9	167.1	160.4	213.0	191.4	6
Other respiratory diseases	15.3	26.0	9.2	14.9	23.1	16.5	11.9	21.4	19
Diarrhœa and Enteritis under 2 yrs.	169.9	177.3	159.9	123.1	150.3	86.5	100.6	114.2	12
Appendicitis	14.5	11.2	14.8	13.1	11.9	10.7	16.3	12.3	30
Hernia intestinal obstruction	11.5	13.6	11.9	12.1	14.2	16.7	13.8	15.7	28
Cirrhosis of Liver	16.3	18.1	17.6	20.4	18.1	30.5	14.4	13.0	8
Nephritis, Brights Disease	94.0	74.7	113.9	142.6	171.9	165.4	89.5	178.5	9
Puerperal fever	9.0	13.3	8.1	7.8	9.1	9.7	5.6	6.1	29
Other puerperal affections	8.0	9.2	7.2	8.9	9.5	6.7	8.3	10.4	24
Congenital debility and malformations	72.9	94.3	53.1	81.0	74.5	67.2	89.5	123.9	7
Violent Deaths excluding suicide	83.5	134.3	95.4	78.3	83.6	87.6	95.9	78.8	21
Suicide	18.3	22.8	20.9	16.9	19.8	28.9	15.3	14.5	14
Ill defined and unknown	4.1	19.6	1.6	15.1	17.5	6.8	17.2	52.2	10
All other causes	233.9	245.1	188.5	194.6	249.0	247.9	273.2	297.7	16

Cancer, cerebral hemorrhage, organic diseases of the heart, pneumonia and violent deaths stand out as the principal causes which have comparatively high rates in Boston.

Again, the large number of deaths of non-residents in Boston is one of the greatest factors in raising the death rate, as has been pointed out repeatedly by the statistical division of the Boston Board of Health.

In 1910 there were 1280 such deaths, and in 1911, 1348.

If such deaths be deducted, Boston's rate for 1911 becomes 15.11.

While Boston's rate is thus raised 2 by deaths of non-residents, estimates indicate that Chicago's rate is raised only .5 by such deaths and New York still less.

There are two reasons why Boston has such a large number of deaths of non-residents. First it has a population in its immediate suburbs greater than the population of the city itself. These people labor in Boston and when ill come to Boston hospitals. The other reason is that Boston is the recognized medical centre for all New England and attracts those afflicted with cancer, for example, a disease more prevalent in the New England States than in any of the other registration states.

Moreover in 1910 Boston had a larger percentage of its deaths over 6 years of age than any of the cities under consideration. In a word, Boston is an old city and has many old people.

With the figures already given, together with the knowledge that a large portion of Boston's population is of foreign composition, unfavorable to a low death rate, it is not difficult to understand why Boston's rate is comparatively high.

Further analysis by age periods and various mother nativities will be possible when the detailed census population figures are given out from Washington.

But in a word it may be safely said that Boston's high rate is largely due to its geographical position in the centre of populous suburbs, and to its fame as a medical centre, and not, as has been so often intimated, to the unhealthful conditions in the city.

HISTORY OF THE ADOPTION BY THE NATIONS OF THE AMERICAN CONTINENT OF THE BERTILLON NOMENCLATURE OF DISEASES AND CAUSES OF DEATH

DR. JESÚS E. MONJARÁS

Mexico

Read before the American Public Health Association, Havana, Cuba, December, 1911

Those who occupy themselves with statistical labors, have understood for the last half century, the necessity of forming, amongst others, statistics and tables of mortality.

This was the object which gave rise to the International Congress of Statistics, and after holding several meetings in different countries, the Congress reached the conviction that uniformity of International Statistics, which would render them comparable, was a much more difficult task than was at first supposed.

In 1885, the principal Statisticians of Europe, met in Paris and afterwards in London. In this city, the International Institute of Statistics was founded with the object of establishing the desired uniformity.

This institute has held several meetings in different countries, always pursuing the same object without attaining it, because, although each country recognizes the necessity of presenting statistics that can be compared with those of other nations, it always considers that the other countries should conform to its own system, so that it may be able to compare the present with the past data, and for this reason, each has for a long time refused to change its methods for the advantage of international comparison.

On this continent, including the United States of America, the American Public Health Association, which has the largest membership of any society of its class, and of which I have had the great honor to fill the Office of Vice-president on several occasions, has occupied itself, amongst other matters, with the revision of the nomenclature of diseases and form of statistics, appointing in 1889 a special International Committee to study and propose the most suitable reforms in that branch, of which committee I was appointed a member.

Its learned President, Dr. Samuel W. Abbot, Secretary of the Board of Health of the State of Massachusetts and an able hygienist, requested my opinion on the subject.

In answer I proposed the system advocated by Dr. Bertillon of Paris, which I had already implanted in San Luis Potosi since the year 1892, after a careful comparative study which I made in the offices of the respective countries, of the English, German, Italian, French and American nomenclatures, and which had been proposed to the Sanitary Offices and Government of this country. (See Annex num. 3, page 310, of the Proceedings of the Second National Medical Congress.)

The other members of the committee called me to a conference in Montreal, Canada, in the year 1894, and there I was able to persuade those gentlemen to adopt the Bertillon System, against the English, and it was shortly after adopted throughout Canada.

The committee which was charged with the study of the different forms of statistics, continued its negotiations in the same sense and obtained from the Association an official declaration in favor of that nomenclature, and the adoption of the following resolutions:

Resolved: That the American Public Health Association recommends that the Bertillon classification of causes of death be adopted by all the statistical offices of the United States, Canada and Mexico, as soon as the change from the present systems can conveniently be made.

Resolved: That the Committee on Nomenclature of Diseases and Form of Statistics, be authorized to order printed and circulated among the statistical offices of the three countries, a circular which will give a knowledge of this resolution, the report of the Committee on which are based the three forms of Bertillon classification, with explanatory notes on the terms employed and practical rules for their compilation, with a list of the statistical offices which have accepted it.

Resolved: That the committee propose an international agreement between the statistical offices of the three countries represented in this Association, and the same offices in France and other countries which now use or hereafter may use the Bertillon System, and that a definite scheme for such alliance be submitted to the next annual meeting of this Association for action.

Resolved: That the Governments of the United States, Mexico and Canada be also invited to adopt this classification, as a basis for the mortality statistics in the census of 1900 and 1901.

In the meeting of the Association which was held in Ottawa, Canada, from the 27th to the 30th of September, 1898, the above resolutions were adopted together with the following, which were moved by the same committee.

Resolved: That the American Public Health Association approves the general principles and plan for the periodical revision of the Bertillon classification of the causes of death, as presented by the Committee on Demography and Statistics.

Resolved: That subject to the approval of the Executive Committee, the President of this meeting of the American Public Health Association appoints committees of three members from each of the countries represented in the Association who will work together and with other similar committees in other countries, on the revision of the Bertillon classification of causes of death; and that such committee be authorized to adopt the necessary regulations which, in combination with other countries associated in the work of revision, may appear necessary for their good administration; that in each annual meeting of this Association, the committee should report on its action, and continue in office until the work of revision is completed and its successors elected for the next periodical revision.

The members appointed under the above resolutions were the following:

Canada	**Dr. Emmanuel P. Lachapelle, Montreal, P. Q.**
	Dr. Peter H. Bryce, Toronto, Ont.
	Dr. Elzéar Pelletier, Secretary, Montreal, P. Q.
Mexico	**Dr. Eduardo Licéaga, Mexico, Mexico.**
	Dr. Jesús E. Monjarás, San Luis Potosí, Mex.
	Dr. José Ramirez, Secretary, Mexico, Mex.
United States	Dr. Samuel W. Abbot, Boston, Mass.
	Dr. A. C. Young, Augusta, Me.
	Dr. Cressy L. Wilbur, Secretary, Lansing, Mich.

Our committee did not confine itself to advocating this system amongst all the states of our Confederation, but also forwarded its proposals to the Southern country, and with great success, as almost all of them had adopted that classification by the end of the year 1900.

Immediately after the International Congress of Medicine and Hygiene, which was held in Paris in the year 1900, the Statisticians met to again discuss the adoption of a uniform nomenclature for death, and powerfully influenced by the remarkable circumstances of the uniform opinion of all the nations of this continent on a subject of such important results for humanity and science, the European nations did not delay in almost unanimously adopting the nomenclature devised by the learned statistician Bertillon, which had been adopted for the first time in this country by myself, as I have already stated.

FURTHER STUDIES ON THE VIRULENCE OF DESICCATED RABIC MATERIAL

D. L. Harris

St. Louis

(Abstract.)

Read before the Laboratory Section, American Public Health Association, December, 1912. Havana, Cuba

A previous paper describes a method of vacuum desiccation of rabic material which preserves its virulence for several months. The essential feature of this process is the maintenance of a temperature several degrees below 0°C. during desiccation in vacuo.

Tests made to determine the amount of virulence in the dried material show this to be approximately 1 per cent of the original virulence.

Various modifications of the method were attempted in order to secure a greater conservation of virulence. It has been found that, if the material be frozen with CO_2 snow and desiccated as in the original method described by Shackell, the dried powder contains from one-third to one-half of its original virulence.

Rabic material so treated is virulent in dilutions of 1-5000 and 1-10,000. This virulence diminishes very slowly. After having been preserved for several months, it still possesses active immunizing properties.

Work is now being carried on to determine (1) the rate of loss of virulence; (2) the effect of temperature, light and chemicals on the loss of virulence; (3) the immunizing value of the dried material.

PRODUCTION OF ANIMAL VACCINE VIRUS. DOUBLE COLLECTION

DR. V. DE LA GUARDIA

Director of the General Vaccine Institute, Havana

Read before the Laboratory Section, American Public Health Association, Havana, December, 1911

The General Vaccine Institute of the Republic of Cuba was founded in 1901, during the first American occupation of Cuba, being governor of the country, General Leonard Wood, who had as his Secretary of the Interior Dr. Diego Tamayo under whose department Institute was a dependence.

The establishment of the Institute, as well as the propagation of the vaccine over the Cuban territory, all that, was due to the initiative and energies of Col. Valery Havard a worthy sanitary chief of the Army Occupation.

The introduction of the vaccine in the island of Cuba was due to a most llustrious man of sciences, a true sage in all senses and particularly for that time, Dr. Tomas Romay. The event took place in the early days of February, 1804. From that time small-pox vaccination in our territory has been known and propagated.

The propagation of the vaccine was under the patronage of the Cuban Economical Society and among its advocates, besides Dr. Romay, the names of Drs. Cozar, Perez Delgado and Messrs. Sanchez Rubio, Bernal Castellanos, Relland, Navarro, Parra, Perez, Carrillo, Lezama, Gorin, Joaquin Navarro and Leon Valdes should be mentioned. Sometime afterwards, Drs. Rafael Hondares and Tomas Mateo Govantes as well as Dr. Angel Cowley, professor of the Therapeutics of Havana University and secretary of the Board of Health deserve equal praise.

To the Academy of Sciences of Havana undoubtedly is due in great measure, the propagation of small-pox vaccination, especially to the never-forgotten president, Dr. Nicolas J. Gutierrez, who with Dr. Zambrana, Dr. Mestre and the respected and beloved Dr. Ambrosio Gonzalez del Valle then, and in more recent times, Drs. Joaquin de Zayas, Luis de la Calle, Felipe Rodriguez, Luis Cowley, Pantaleon Machado, Jose Beato, Ramon L. Miranda, Gabriel Maria Garcia, Miguel Riva, Vicente Benito Valdes and others, all of whom were members of said academy.

The academy has at present a Vaccinating Commission which works with usual regularity. The work until recently was carried out by Dr. Gustavo Lopez, but today Dr. Jorge Le Roy is in charge of it.

The establishment in Cuba of an animal vaccine institution took place in 1868; being its founder, Dr. Vicente Luis Ferrer, who on his own private initiatives and personal effort, put it in working order.

The Provincial Board of Health formed in 1878, approved warmly the creation of a Provincial Institute for vaccine and on the 28th of June, 1880, the equipment of said institute took place, due in part to the perseverance of Dr. Luis Cowley, the professor of Hygiene of Havana University. Since that time until 1901, when the General Vaccine Institute of the Island of Cuba was established, I have been the director of the same.

Until a short time before the end of Spanish rule in Cuba, vaccination was carried on regularly, once a week in the interior of our churches.

In the City of Havana there have existed some private institutes of animal vaccine; Matanzas and Santiago de Cuba also have had such institutions.

Presently, and since 1901, the General Animal Vaccine Institute supply vaccine virus, free, to all the Municipal districts of the Republic of Cuba, and at the Institute itself not only is vaccination carried on, but vaccine virus is supplied to all who applied for it.

The principal object of this contribution is to inform you of the production of vaccine virus since the foundation of the Institute.

All the details relative to this matter will be found in the accompanying table.

In the production of the virus, the Institute follows the method of Professor Degive, of the Brussels Veterinary School, director of the Vaccine Institute, which consists in the double collection from the same animal; the method is somewhat novel, it being used only in Havana and Brussels; but it is exceedingly simple. The first collection is made on the fifth day (five times in twenty-four hours); the second, takes place on the seventh day (forty-eight hours after the first collection), and the vaccine virus in so short a time, that is with reference to the interval between the first and second collection, germinates almost always in greater amount.

The average amount obtained formerly when only one collection was made, fluctuated between 60′14 grams as a maximum and 39′64 grams as a minimum for each animal.

With the double collection method the average amount fluctuates between 116′71 grams as a maximum and 81′50 grams as a minimum for each animal.

The beneficial qualities of our vaccine preparations (collection A. and collection B.) have been perfectly proven, in the first place, by daily use since 1906 (second semester) both virus giving satisfactory results; secondly, we have received satisfactory letters from Dr. Rosenau, director of the Laboratory of the United States Public Health and Marine Hospital Service of Washington, Dr. Blaxall of the London Government Lymph Establishments, and finally from Dr. Huddlestone of New York's Health Department.

Year	1-2 Year Periods	Animals Inoculated	Average weight of each Animal in Pounds	Average No. of Scarifications per Animal	Total in Grams	From each Animal Max. and Min.	Production of Vaccine—(Grams)			
							1st Collection.		2nd Collection	
							Total	From each Animal Max. and Min.	Total	From each Animal Max. and Min.
1901[1]	....	73	......	.....	3751	**51 38**				
1902[2]	.....	23	**290**	. .	917	**39 86**				
1903	....	46	**275**	....	2036	**44 26**				
	1st	27	**247**	**122**	1178	**43 62**				
1904	2nd	27	**268**	**115**	1102	**40 81**				
Total		54			2280					
	1st	28	**318**	**124**	1684	**60 14**				
1905	2nd	32	**279**	[3] [4] **81**	1776	**55 50**				
Total		60			3460					
	1st	20	**272**	**49**	931	**46-55**	841	**40-05**	[5] 90	**45-00**
1906	2nd	13	**289**	**63**	919	**70-69**	401	**30 84**	518	**39-84**
Total		33			1850		1242		608	
	1st	20	**287**	**67**	1630	**81-50**	759	**37-95**	871	**43-55**
1907	2nd	15	**287**	**68**	1401	**93-40**	611	**40 73**	790	**52-66**
Total		35			3031		1370		1661	
	1st	21	**297**	**53**	1916	**91-23**	818	**38-95**	1098	**52 28**
1908	2nd	15	**327**	**64**	1415	**94 33**	595	**39 66**	820	**54 66**
Total		36			3331		1413		1918	
	1st	23	**318**	**64**	2172	**94-43**	960	**41-73**	1212	**52-69**
1909	2nd	23	**328**	**70**	2315	**100-65**	1122	**48-78**	1193	**51-86**
Total		46			4487		2082		2405	
	1st	24	**343**	**75**	2423	**100-95**	1192	**49 66**	1231	**51 29**
1910	2nd	14	**342**	**79**	1634	**116-71**	736	**52 57**	898	**64 14**
Total		38			4057		1928		2129	
1911	1st	21	**344**	[illegible]	1883	**89-66**	883	**42 04**	1000	**47 61**

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[1] From August to January, 1902.

[2] From February to December.

[3] 31 animals were scarified.

[4] The Umeno scarifier was used from this time on. Previously the scarifications were made with the point of a bistoury.

[5] Double collection from the two animals only.

HEALTH DEPARTMENT REPORTS

Providence, R. I.

The death rate of Providence for 1911 was 15.56 per 1,000. Dr. C. V. Chapin, the Superintendent of Health, reports that this is the lowest death rate recorded during the 57 years of registration. Interesting reports are made of the work of medical inspection of schools, the school oculist and the dental inspector. It is interesting to note that at the urgent request of the Superintendent of schools a neurologist has been appointed to give careful study to backward and defective children.

Dr. Chapin again refers to the conclusion reached by him some years since that there is usually no very great extension of scarlet fever and diphtheria through schools. He states that it is generally the practice of this department not to exclude from school children in a house where there is scarlet fever or diphtheria, except children of the family in which the disease actually exists. If, however, it is believed that there will be no isolation, and that there will possibly be a mingling of all the children in the house, they are all excluded. In the majority of instances the other children in the house are allowed to attend school.

"The rule in Providence is to exclude from school all children living in diphtheria families for four weeks from the beginning of the last case. But if two sets of nose and throat negatives can be obtained from each school child in the family at any time after the warning sign has been removed, permits are given. (The warning sign is removed ten days after the disappearance of the exudation.) When the four weeks have elapsed, even if diphtheria bacilli are found, school permits are nevertheless given."

It is worth noting that only 118 disinfections were performed. It will be recalled that disinfection after communicable disease in this city is not compulsory and is only done when desired by the family.

Dr. Chapin gives figures to show that recurrences of diphtheria and scarlet fever are entirely independent of disinfection, or the lack of it.

Maritime quarantine had become negligible in Providence until this year, when the Fabre Line commenced disembarking immigrants at that port. On account of the presence of cholera in Italy, bacteriological examination of the immigrants was established. No cholera carriers were discovered. Dr. Chapin points out the necessity for providing Providence with a properly equipped quarantine station, etc., and states that unless the city council is willing to incur such an expense, that the Federal Government ought to be asked to take charge of quarantine at this port.

Dr. Chapin's report contains as usual very valuable statistical information with regard to communicable diseases. It would be distinctly advantageous if all other large cities would present their figures of communicable disease as clearly as those contained in this report.

Winnipeg, Manitoba.

Dr. A. J. Douglas, the Medical Health Officer of Winnipeg, presents an unusually full and attractive annual report. The gross death rate for 1911 was 12.8 per 1,000. This is an improvement of nearly 1% over 1910. Dr. Douglas points out wisely that "it should be borne in mind, however, that our population is very largely made up of persons in the prime of life who are constantly arriving here from other parts of Canada and from the older lands. Stable conditions have not yet been reached nor will they be while this great wave of immigration continues. Therefore, while we may congratulate ourselves on a low death rate, we should, nevertheless, aim to arrive at conditions which, with a population so favorably constituted as regard age, will make it possible to reduce this rate still more."

The infant mortality rate was 165.1 per 1,000 births. This was higher than the rate in 1910, the increase being accounted for by a severe outbreak of scarlet fever occurring in the early part of the year. There was 7% less deaths of infants from acute gastro-intestinal diseases than in the previous year. The death rate for typhoid fever was 7.9 per 100,000. This is considered, and naturally so, to be a most satisfactory showing and, when compared with the rate of 248 in 1905, furnishes an illustration of what can be done by cleaning up. Scarlet fever was the greatest problem with which the authorities had to deal in 1911. 1,030 cases of this disease were reported and 124 deaths. Contact infection seemed to play the most important part in the outbreak.

The report contains full information with regard to the collection and disposal of refuse. Students anxious to study costs of collection and disposal by cremation will find much of value in this report. The section of the report dealing with the work of the Food and Dairy Commission is very full, and speaks well for the energy and ability of P. B. Tustin, the chief of this division. Space forbids further comment on this excellent report. It is extremely well printed and illustrated.

PUBLIC HEALTH NOTES

Occupational Diseases.

Dr. H. Linenthal, one of the Massachusetts State Inspectors of Health, in a paper on the Prevention of Occupational Diseases, in the May 23, 1912 issue of the *Boston Medical and Surgical Journal,* summarizes very clearly the measures to be adopted to prevent the ill effects upon health from industrial processes or conditions. They are as follows:—

1. To collect complete and accurate data about industrial processes and about conditions under which the various industries are carried on.

2. To obtain more accurate and detailed information relative to occupation on morbidity and mortality records.

3. To instruct the medical student in this important field of preventive medicine by a course of lectures on the more important industrial processes and the diseases to which they give rise.

4. To place the specific industrial diseases on the list of diseases notifiable to the central health authority.

5. To examine periodically all workers in certain industries, these industries to be named by the central health authority.

6. To exclude minors and women from certain industries which are designated by the central health authoritiy as injurious to health.

7. To have adequate laws regulating sanitary conditions and protective devices in industrial establishments, and to have such laws intelligently enforced.

8. To have the central health authority issue regulations for certain dangerous trades with instructions to employers and employees how to guard themselves against the ill effects of their work, and to have such instructions posted in the workrooms.

9. To carry on an extensive educational campaign both among employers and employees as to the value of protective measures and good sanitary conditions.

The Composition of Expired Air.

A review of the literature of this subject, discussing the relative importance of its physical and chemical characteristics, appeared in the Monthly Bulletin of the State Board of Health of Massachusetts for April. The author, Dr. H. Linenthal, State Inspector of Health, after considering the work of Pettenkofer, Brown Sequard, D'Arsonval, Billings, Wolpert, Flügge, Rosenau, and others, expresses his conclusions as follows:

"From the review of the above literature it can be seen that while the question as to whether the expired air contains any substances injurious to the animal organism is still regarded by many as unsettled, in view of the thorough experimental work by many competent observers it can no longer be questioned that temperature and humidity are factors of extreme importance in determining the proper ventilation of premises, and that careful attention to these factors is of greater importance than the determination of carbonic acid gas."

School Ventilation.

A valuable contribution to school ventilation is to be found in the June 7, 1912 issue of the Metal Worker, Plumber, and Steam Fitter, from the pen of Mr. Frederic Bass of the Minnesota State Board of Health.

Experiments have been made in the ventilation of school rooms, by individual air ducts, each desk being equipped with a fresh air funnel. An experimental plant was designed to distribute the air in the school room of one of the Minneapolis public schools, so that all scholars would receive equal quantities and the same quality of air.

"The air to be delivered to the pupils in the room was taken in through a window in the basement and passed over two Vento radiators to a Webster air washer and humifier, thence to a heating coil, from which the air was blown to the outlets in the room by means of a Sirocco blower. The main duct from the blower was carried along the ceiling at one end of the basement room immediately below the room in which the pupils to be the subjects of the experiment were located and from it three ducts were extended parallel to the rows of desks. From these ducts, the air was carried through 2-inrisers extending through the floor to each desk in the room above, at which point it entered the room through funnel-shaped orifices."

"The plant was kept in operation for about four weeks, and during this time it was found possible to ventilate the room satisfactorily with the crude apparatus installed with 8 cu. ft. of air per minute per pupil. During the last few days the ozone apparatus was in operation, and although the cost of the current to operate it was but a few cents per day, a decided "freshening" of the air was noticeable. On four successive days, experiments to determine the mental ability of two selected groups of pupils were carried on by Professor J. B. Miner, of the University of Minnesota, first under this system and second under the old system of ventilating providing 25 cu. ft. of air per minute per pupil, but no perceptible difference in mental capacity of the pupils was noticeable. The test, however, was probably unsatisfactory on account of the short duration of the experiments.

It is expected during the coming year, with the permission of the Minneapolis Board of Education, to continue the experimental work from a physiological standpoint.

It is intended that this room, together with a similar adjoining room under the ordinary system of fan ventilation as a control, will be in operation. The environment of each child outside of the school building will be carefully recorded. The weight, blood-pressure, respiration, pulse and other necessary data will be obtained during a series of experiments lasting several months, and it is hoped that some connection between the physiological condition of a school child and the quality and quantity of air which he receives may be determined. The apparatus which has been described and which has been in use for over a month has shown conclusively that 8, and perhaps as low as 6 cu. ft. of air per minute per pupil will be sufficient for ventilation when it is properly distributed.

The cost of installation of such a system in a new building equipped with the new hollow standard desks acting as risers and with a modified funnel outlet, will not exceed that of the present ordinary systems when the diminished size of main ducts, fans and engines or motors is considered."

Housing in Hamilton.

Dr. Roberts, the Medical Officer of Health of Hamilton, recently made a preliminary report on the housing situation of his city. In all 260 families were visited and in many instances very unsatisfactory conditions were discovered, and Dr. Roberts points out that Hamilton, after having passed with comparative ease and safety through the dangers and diseases of infancy and childhood now finds itself in common with all rapidly growing cities, face to face at the threshold of adult life, with the chances of plague infection incident to the maturity of most urban communities. It is encouraging that Hamilton realizes its danger at the present time so that it can take the necessary steps to prevent the evils of bad housing to increase and to eradicate existing conditions.

Rural Tuberculosis Campaign.

The crusade against tuberculosis will be carried into the rural districts of the state of Wisconsin by the State Anti-Tuberculosis Association this summer. This work, which has never been done elsewhere, has been made possible by a gift of a motorcycle from a friend of the association.

Mounted on this machine, Mr. Theodore Werle, field worker of the association, will make a tour of the state, visiting villages and cross roads, and later in the year rural schools.

Besides a stereopticon with slides, an exhibit of seventeen charts, and literature for distribution, Mr. Werle carries a complete equipment for sleeping out of doors and doing his own cooking. Because he is not tied down by train schedules and can travel rapidly, he can reach enough people in a day to make country work practical.

In an attempt to take the gospel of good health to the country, where there is a great deal of tuberculosis, a lecturer and an exhibit were sent out last year with a team and a wagon, but the cost of keeping a team and the loss of time in getting from place to place made the work almost prohibitive. It costs less on the motorcycle, however, than traveling by rail, as it is possible to reach the most remote sections.

The Press and Public Health Work.

"No greater single agency for the advancement of public health education exists, than is found in the press of this State. Nor is there to be found anywhere a class of men more willing to assist in the uplift and upbuilding of their own community and of the State than the editors and managers of these newspapers.

During the last eight or nine months practically every one of the leading daily, weekly and semi-weekly newspapers and other publications of the State have from time to time been carrying more or less public health information in their columns. From the best available information it appears that something like 160 papers have been supporting this campaign for better health, happiness, and efficiency. The total subscription enrollment of these papers approximates 475,000. It would seem that there can scarcely be a home in North Carolina into which such health information has not found its way. If the total amount of health matter used by these papers in the last eight months were joined end to end, it would form a newspaper column approximately 161 miles long.

It is comparatively easy to compute the total amount of such printing done, but who can ever estimate the amount of good this is bringing to the people of the State? The great flood of inquiries for literature, bulletins and further information received at this office serves as a testimony or index to the eagerness with which the public reads such items. This is particularly noticeable when the papers advise their readers that certain health literature, bulletins and pamphlets can be obtained at this office.

If the newspapers and other publications of the State continue in the future as they have in the past, the public will soon know the cause and will apply ther emedy to many of the diseases and ailments affecting the life, health and efficiency of individuals and communities, which heretofore were supposed to be the dispensations of a beneficent Providence. Furthermore, it will be only a question of time until the public will demand the enactment and enforcement of such laws, State and local, that will look to the better safeguarding of the State's greatest wealth—the health of her citizens."

W. H. B.

Editorial, *Bulletin* (N. C.) *State Board of Health*, July, 1912.

6th Pan American Congress.

The Sixth Pan American Congress will convene in Lima the first week in August (3rd to 10th) 1913 in connection with the Latin American Medical Congress and the Congress of Hygiene.

It will be under the patronage of His Excellency the President of the Republic of Peru, and of the Minister of Foreign Relations of Instruction and of Fomentation.

The most distinguished physicians and surgeons in the country are in charge of the working of the various Sections of the Congress of which there will be eight in number, one of which will be devoted to Hygiene.

The Healthologist.

One of the most attractive health department bulletins which comes to our desk is the Healthologist, issued by the Health Department of Milwaukee, Wisconsin. It is extremely well printed and has many excellent illustrations. This bulletin must undoubtedly be of great educational value to the city of Milwaukee and Mr. F. W. Luening deserves much credit. The name seems somewhat unfortunate though.

Other cities might copy the Healthologist to advantage.

A Board of Health Tuberculosis Dispensary.

The town of Brookline, Massachusetts, is already noted among the thriving suburbs of Boston for its Public Baths and its Municipal Gymnasium. It has also good playgrounds which last winter were turned,—many of them—into skating parks, by simply flooding and freezing.

Brookline has now taken another forward step by the establishment of a Tuberculosis Dispensary under the auspices of the Board of Health which, owing to the fact that Brookline clings tenaciously to the old New England form of "town government"—in spite of the fact that it is virtually a city, having a population of about 30,000,—is not really a Board of Health at all, but a Board of (five) "Selectmen" who are *ex officii's* "the Board of Health." That this Board, only one of whom is a physician, have been enlightened and progressive enough to establish a Tuberculosis Dispensary for Brookline, is due largely to the influence and efficiency of the Health Officer of the Board, Dr. H. Lincoln Chase.

The objects of the Dispensary are:—

1. To provide a free dispensary for the examination, treatment and assistance of persons who have tuberculosis, also for persons in poor health who may or may not be in the early stage of the disease and need to know in order to make an early and sure recovery.

2. To secure proper care for tubercular patients in their homes, where the dispensary nurse (an important and interesting adjunct) will visit them when desired and attend to their special needs.

3. To furnish free medical attendance in their homes when required by patients who are not in condition to come to the dispensary.

4. To co-operate with other agencies in the town to furnish special diet (milk, eggs, etc.), and such other aid as may be required.

5. To give advice and instruction as to the carrying out of proper treatment and as to the protection of other members of the family from infection.

6. To aid patients to gain admission to suitable sanatoriums and hospitals. Practically every tubercular patient in Brookline who needs it can be provided with proper sanatorium care.

7. To assist discharged hospital and sanatorium patients to prevent relapses.

Action of this sort on the part of any town or municipality is encouraging and creditable, and Brookline's example in this as in so many other aspects of public welfare work is worthy of wide imitation.

Mechanical Filtration.

"The day of retribution long anticipated by a few engineers has at last dawned for the mechanical filter. Years ago it was pointed out in this journal that the adoption of the term mechanical to designate the rapid sand filter would eventually produce confusion in the minds of city officials, and that is exactly what has occurred at Columbia, S. C. In the last annual report of the Water Department this statement will be found: The discontinuance of a bacteriologist at the filter plant, and the substitution of a competent mechanic to operate a mechanical system of filtration, is a most advantageous one for the city and water department. The water analysis will be in the hands of recognized competent officials and the filter plant will be safeguarded by a competent mechanic. The Water Department is now in a position to provide the best and safest means of protection to its patrons.

"The facts in this matter are decidedly interesting. For five years Columbia had a chemist and bacteriologist in charge of its water purification plant, enjoying the distinction of being one of the few municipalities in the South owning a purification plant which employed such a specialist for this purpose. But the curse of a bad name was too much to be borne, and so a machinist has been substituted for a chemist because the plant is a "mechanical" one. The introduction of this term in connection with water purification with water purification works took place so long ago that possibly a good many readers may not recall that it was due to the use of revolving rakes for stirring up the surface of the sand in the filter beds when they were washed. This mechanism has disappeared very largely from the municipal filters, and it was never anything but a mere mechanical detail, so that the designation of the filtration system involving the use of a coagulant by the term "mechanical" never had any sound basis. And now that its logical result has followed in Columbia and a machinist has been substituted for a chemist to manage the filtration plant there, it is to be hoped that the rapid sand filter will not be called a mechanical filter by engineers to such an extent as heretofore."

Editorial, Engineering Record, Vol. 65, No. 23.

Dust Fever.

"An industrial disease which I have several times encountered but have never seen described, is well known among grain threshers as "dust fever."

I have found on inquiry that the ailment occurs also among flax hatchelers. As it is caused by the inhalation of dust in excessive quantities, it probably occurs in various occupations supplying this essential etiological factor. The only cases coming under my observation, however, have been among threshers, or farm laborers engaged in grain threshing.

Grain becomes musty when the curing process, during harvesting, is interrupted by rains; and the production of dust is thus greatly increased. This renders the work of threshing in the barn, as commonly done in the northern states, particularly disagreeable; and the laborers engaged, subject to the ailment. It is not improbable that certain elements in the dust possess toxic properties and that these, rather than the mere mechanical irritation of the particles, cause the trouble; but this is merely problematical.

Dust is mentioned, incidentally, by some writers as a cause of coryza; but the symptomatology of coryza is so mild, comparatively, that it apparently was never meant to include the subject of this article.

The sickness begins in the evening or during the night following the day's work in dust. The symptoms are severe; often alarming. There is a pronounced chill and usually vomiting. The face is flushed. Patient may be delirious and with a temperature as high as 104. There is marked congestion of the mucous membrane of the respiratory passages. The picture is not unlike that often presented at the onset of pneumonia in a robust subject.

The symptoms moderate during the second and third days. A copious exudation from the nasal and bronchial passages, eliminating microscopic quantities of dust."

Dr. F. J. Bowen in *New York State Journal of Medicine,* July, 1912.

Okanogan County, Washington.

Very few county Boards of Health publish monthly bulletins. An exception to the rule however is the Sanitary Digest, a monthly booklet published by the Board of Health of Okanogan County, Washington. Dr. H. M. Fryer, the county health officer, is the editor. The June 1912 issue is devoted to a report of the result of a visit of the health officer to the various towns throughout the county. It is certain that the publicity given to the sanitary or insanitary conditions of the various towns visited must be an incentive to them to develop a high sanitary status.

Purifying Thames Water.

"Purification of the Thames water by the addition of quicklime with subsequent dilution to rend it potable is suggested by Dr. A. C. Houston of the Metropolitan Water Board of London, England. Dr. Houston states that 15 lb. of quicklime, costing about 3 cents, added to 7,500 gal. raw water would kill the B. coli, and inferentially but certainly the microbes of epidemic water-borne diseases, such as the typhoid bacillus. The excess of lime would then have to be neutralized with 2,500 gal. or one-third of the volume of adequately stored water to render it potable. In this way 75 per cent of the water would be sterilized chemically and the remaining 25 per cent sterilized by storage. Subsequent to this treatment, rapid filtration alone would be required to remove the precipitate of inert carbonate of lime and to bring the water up to a reasonable standard of chemical purity. He states that this system would be more expensive than sand filtration, but would have certain distinct advantages, notably its adaptability, its special suitability for flood waters, its capacity to render an initially foul water absolutely safe in a reasonably short space of time."

Engineering Record, Vol. 65, No. 22.

Is the Health Officer's Work Worth While?

"We cannot magnify too highly the Health Officer and his work. It is a great achievement to make two blades of grass grow where only one grew before. It is a great achievement to make an acre of ground produce 100 bushels of corn where it only produced ten before, but what good can it do you when you are dead? It was a great thing to link two oceans together by steel rails, but you don't care to ride on the train when you are dead. It is a great achievement to link the two oceans together by the Panama Canal, but what will you care about it when you are dead? It is wise and proper that Congress should appropriate one hundred million dollars for good roads, and that the states and counties should use their convicts in building good roads, and that the counties, towns, and townships should issue bonds and use the proceeds in building good roads, but good roads won't be worth anything to you when you are dead. It is wise and proper that our Government should look well to the conservation of her natural resources, the conservation of her forests, the conservation of her water powers, the conservation of her coal fields, the conservation of her soil; but these, while important, are insignificant when compared with the conservation of human life.

In the economies of a nation there is nothing so important as the conservation of human life. It has been well said by Senator Owens, that the conservation and the efficiency of our people is a problem of the first magnitude, demanding immediate and intelligent attention. And by Sir Frederick Treves, that "health is the essential factor in productiveness, prosperity and happiness, and hence in the advancement of civilization." And by Lord Beaconfield, that "Public Health is the foundation on which reposes the happiness of a people and the power of a country. The care of the public health, then, is the first duty of a nation." And by Mr. A. H. Eller, Chairman of the State Democratic Executive Committee of this State, that "the lives and health of the people stand first among all the duties which an enlightened State owes to a loyal citizenship. Grander conceptions of human worth demand that preventable diseases be subdued as the common enemy of all."

If all these things be true, and they are true, then who would dare minimize the importance, the work, the responsibility of the Health Officer? What town council, what Board of County Commissioners would dare tie the hands of their Health Officer by refusing to make a sufficient appropriation to enable him to carry this message of life, health, happiness and prosperity to all the people of his town and county? Who would dare suggest that a Health Officer do this most important work as a labor of love? Who would think for a moment that a matter of so great and far reaching importance would occupy less than the entire time and energy of the best man that could be procured?"

From address of President of N. C. State Health Officer's Association.

American Water Works Association.

At the thirty-second annual convention of the American Water Works Association, held in Louisville, June 3–8, resolutions were adopted urging upon boards of health the importance of ascertaining and recording the distribution of typhoid fever by causes and modes of infection, to the end that a division of responsibility may be made between water supply, contact cases, general sanitary conditions, milk and other food supplies liable to contamination and typhoid carriers. It was further resolved that boards of health be urged to do their full duty in the elimination of all causes of the spread of typhoid fever.

Extension of the Idea of Sickness and Accident Insurance.

Those who have been watching with close interest the operation in Germany of the Workman's Sickness and Invalidity Compulsory Insurance, as incorporated in 1882 and the strenuous opposition to some of the features of Mr. Lloyd George's Bill of a similar sort recently passed through the Parliament at London, will be interested in the further extension of the principle in a direction which has surely never occured to us on this side of the Atlantic.

In a popular referendum in February 1912, the Federal law passed by the Legislature of the Swiss Cantons in June 1911 was approved by the people by a majority of 48,000 in some 500,000 votes. The Bill is very complete, dealing (a) with the Constitution of the National Swiss Accident Insurance Society (b) with assistance of Societies in cases of sickness (c) with compulsory insurance (d) with voluntary insurance.

The special federal insurance fund, that must be exclusively devoted to sickness and accident insurance amounted at the end of 1911 to 40 million francs, while the estimated charges against the fund are estimated at about 8 millions. The total number entitled to the benefits will be 700,000 persons—550,000 compulsory and 150,000 optional. Under the law mutual societies are the especial type of organization and for the farmers, the chief benefit is the provision of a doctor as "the Society obtains the doctor's services cheaper than the farmer could." The law extends the benefit to women at confinement and to mother and child for a period of nine months thereafter. Regarding the relation of the doctor and the societies the law lays down the rule of limited free choice amongst the doctors of the neighborhood where no exclusive bargains do not exist with certain doctors exclusively. Federal assistance from the fund is proportioned to the benefits assured by the mutual societies. Of special importance is the provision in encouraging societies being formed in the high mountain cantons, where doctors are few. Special grants are given where a commune succeeds in getting a doctor to live in the valley and attend the sick. This may be extended by giving a distant doctor special traveling fees according to distance. The special report further states that this grant may take the form of subventions for laying a rural telephone to sparse settlements.

Such illustrations of advanced legislation in different European countries seems at first foreign to our American ideals; but with a rural population in Canada and the United States of nearly 50% of the total, it is plain that the problems of organized aid cannot be evaded. In the matter of tuberculosis, it has a splendid and rapid evolution and in nothing else can it find so directly favorable a field as in the various methods now being developed for lessening infant mortality. Perhaps it is not very necessary as yet in the well-to-do rural districts of the United States and Canada; but even in those in some parts as amongst the Negroes and Indians and in the mountains of Mexico, organized medical assistance will prove one of the most potent factors in the saving of the young lives of the natives.

P. H. B.

Association for Study and Prevention of Infant Mortality.

The transactions of the second annual meeting of the American Association for the Study and Prevention of Infant Mortality has recently been issued. The volume consists of 418 pages and contains papers on Eugenics, Continuation Schools, Milk Supply, Housing, Midwifery, Nursing and Social Work. Most of the persons who have been specially identified with infant saving work have contributed. This book should be in the hands of all Health Officers as they will find much in it which will be of assistance to them in their efforts to curtail the infant morbidity and mortality in their communities. The transactions can be obtained by addressing the American Association for Study and Prevention of Infant Mortality. 1211 Cathedral Street, Baltimore, Maryland. The cost of the volume is $3.15 including postage.

Traveling Library.

The State Department of Health established a traveling library for the health officers about a year ago, and the applications for sets of books soon exceeded the supply, and the notice concerning the traveling library was omitted from the Monthly Bulletin. All requests for the books have now been complied with and several sets are at present on hand and the State Department of Health will be pleased to have them used by health officers. Each set consists of six books, viz.: Diseases of the Skin and Eruptive Fevers, by Schamberg; General Bacteriology, by Jordan; Pulmonary Tuberculosis, by Pottenger; Principles of Sanitary Science and Public Health, by Sedgwick; Sewage Disposal, by Kinnicutt, Winslow & Pratt; and Water Supply, by Mason.

Monthly Bulletin, New York State Dept., of Health, June, 1912.

The Prevention of Dental Caries.

By Dr. J. Sim Wallace. Second Edition. London: Published at the Office of *The Dental Record*, 1912. Price, 1s. 6d. net.

"The appearance of a second editon of this book within a few months of its first appearance is evidence that is has attracted considerable attention. This is not surprising, for dental caries is a subject in which most persons are interested, and Dr. Sim Wallace has some important things to say about it. He maintains that 'the cause of caries is the prolonged retention or stagnation of fermentable carbohydrates in more or less immediate contact with the teeth, and undisturbed by the free access of saliva.' The usual preventive measures advocated, antiseptic mouth-washes, tooth-brushing, and tooth-powders, he considers are of little avail, being ineffective as cleansing agents, and possibly productive of harm. Dental caries, he holds, can only be prevented by a proper choice of diet. Food, particularly the food of children, should be of such consistency as to require vigorous mastication. Efficient mastication keeps the mouth physiologically clean and the teeth and gums strong and healthy, and there is no other really effective way of prevention. Such is the teaching of Dr. Sim Wallace, and we strongly recommend this suggestive and stimulating book to all medical practitioners, and especially to those engaged in the practice of preventive medicine."

Public Health, Vol. XXV, No. 9.

Insects.

Insects— The common Forms in Relation to Public Health; Methods for Their Destruction—is the title of an up-to-date and useful bulletin issued this year by the Pennsylvania State Department of Health. The insects discussed are the mosquito, the common fly, the flea, the cockroach, the bed-bug, the house ant, various varieties of lice, and the itch mite. The life history of each insect is outlined and the latest practicable methods of combating it are presented.

Pennsylvania Health Bulletin, No. 32, Feb. 1912.

The Organism of Typhus Fever.

"In the *Zeitschrift für Hygiene und Infectionskrankheiten, Vol.* 70, 1912, Dr. Fuerth gives an account of an investigation into the nature of the infective agent in typhus fever. The author took the opportunity of a small outbreak of typhus fever among Chinese coolies and some Europeans in Tsingtau, which borders on the province of Shantung in China, to make some investigations into the infective agent of this disease.

This is a district which is somewhat liable to be invaded by typhus, for there was a considerable outbreak (over 300 cases) in 1899, but only occasional cases till Spring 1911. The cases comprised 15 Europeans and 50 Chinese coolies. It apparently started among the Chinese, the condition of overcrowding and dirt, in which they more or less habitually live, favouring its spread. The symptoms and clinical aspects of the disease did not differ from those with which we are familiar, except that among the Chinese they were much milder and ran a more favourable course than among the Europeans, the case mortality of the former being only 11 per cent against 33 per cent for the latter.

Very full bacteriological inquiries were made into the cases, and inoculation experiments were carried out on apes, rabbits and rats, and the following is a summary of the results obtained. In 38 per cent of the cases a diplo-bacillus was found in the blood and organs by means of staining and cultural methods. In a series of cases they got pure cultures. The organism was short and thick and altered a good deal in form when planted on different nutrient media. When grown on agar and tested biologically it resembled strepto-coccus pyogenes, so that you might imagine you were dealing with a form of this organism or a subspecies, though it differed in microscopical characters and in its growth in milk and its affinity for Gram's stain. It resembled the bacteria found in some previous observations in earlier epidemics in various places, especially in the method of demonstrating its presence, as well as in its morphological and cultural characters. The best time to find the organism in the blood was found to be late in the illness, 2 to 4 days before defervescence, and examination of blood by staining thick drops gave a good result. A much better result could be obtained by adding ascetic fluid and glycerine to the media used, whether they were solid or liquid. If this is not done, you very often get no growth. The media should also be weakly alkaline. Agglutination does not seem to have been a constant phenomenon, but occurred in some cases in dilutions of 1:40 and 1:60. Pure cultures were not very pathogenic when injected subcutaneously and intraperitoneally into apes, rabbits and rats, and they lost their virulence on continued transplantation. Subcutaneous and intraperitoneal injections of blood from typhus cases into apes (*Macacus rhesus and Macacus cynomolgus*) produced a feverish illness after 10 to 14 days incubation, which lasted 5 to 7 days continuously and made the animals appear ill. In two of the apes they succeeded in recovering the diplo-bacillus in pure culture from the organs of the body during the first few days of fever, i.e., 12 to 13 days after inoculation.

The authors are not quite sure whether this organism is the cause of the disease or a secondary infection, but they are inclined to think that it is probably the cause, but hope further investigations will be undertaken."

Public Health, July, 1912.

New York Fly Fighters.

"A squad of policemen are to be assigned to the Health Department to assist in making war on the fly. It is a violation of the sanitary code to leave a garbage can uncovered and the policemen are to see that this section of the code is obeyed; if it is too frequently disobeyed arrests are to be made. It is pointed out very emphatically that the co-operation of the public is desired in fighting the fly nuisance."

Jour. A. M. A., July 6, 1912.

Typhoid in Cincinnati.

An investigation of the probable source of infection in 55 cases of typhoid fever, occurring since the first of the year, reveals some interesting facts.

Particular attention is given to the water and food supplies, especially milk, to contact with other cases and to the method of sewage disposal.

Twelve drank unfiltered river water. Eight drank from cisterns, 3 from wells, 2 from springs, and 26 from filtered water.

One had been in contact with a typhoid patient during the period of incubation. Three are still under investigation.

In 38 cases the sewage disposal was by privy vaults, cesspools, or even more primitive methods.

Over 90 per cent of the houses in the city are supplied with filtered water.

Less than 10 per cent of the domestic water supply (cisterns, raw river water, and springs) furnishes 50 per cent of our typhoid. In other words, the attack rate per 100,000 of population using filtered water for the first five months is 7.87, while for those using other sources of supply the attack rate is 70.3, or almost ten times as great.

This is entirely too high. The only way to stop it is to extend the water mains and compel property owners to make connections.

Between one-third and one-half of the houses are connected with sewers, or 34,500. At the rate sewer connections are being made, many years must pass before even one-half the city disposes of its sewage properly.

In the above cases, the water supply seems to be of vastly greater importance as a causative factor than any other source investigated.

People contemplating a trip out of the city to some place where little or nothing is known concerning the purity of the water should submit to typhoid vaccination before doing so.

This proceeding has passed the experimental stage, protects against typhoid as certainly as does vaccination against smallpox, and should be done by the family physician. All people exposed to the possibility of contact infection should be immunized.

Those unable to employ a family physician can receive the treatment by applying to the Health Department.

Weekly Bulletin, Board of Health, Cincinnati, Ohio, June 8, 1912.

The Waiter's Napkin.

"It is strange that people otherwise very particular as to how they eat and drink, as well as what they eat and drink, should submit to a number of unpleasant, not to say unsavoury, accompaniments when they partake of food in public places, which they would not tolerate in their own homes. It is certainly a remarkable tribute to the omnipotence of the waiter that such things should be. Take, for example, that functionary's napkin, which is used for a variety of purposes other than to give the official brush up to one's plate which is so ceremoniously performed. We have seen this soiled piece of napery made use of by a waiter—in the intervals of serving his customers—quite impartially, whether it was to dust his trousers, or his boots, or even to wipe his perspiring forehead, and on more than one occasion to wipe his nose! A moment later he is perhaps rubbing the plate of a patron with this same napkin, which, when not being employed in any of the multifarious duties outlined above, is generally reposing in orthodox fashion in the armpit of a dusty and probably greasy evening coat. It is very little better to have one's soup handed to one after gently laving the visibly dirty thumb of the average waiter. True there have been sporadic attempts made to introduce the use of white cotton gloves, but the impossibility of keeping these for even a few hours in a state in any degree approaching their pristine purity is obvious. Whilst we need not allow our imagination to run riot as to what may occur in the average hotel or restaurant kitchen, it is surely not too much to expect cleanliness in the actual serving of food. Certainly these and similar little unsavoury details are worthy of the attention of the public purveyors of food, for although for the most part people endure them uncomplainingly, for some of us undoubtedly they 'cloy the hungry edge of appetite.'"

British Medical Journal.

Dangers of Swimming Baths.

"The multiplication of public swimming baths has been rendered necessary by the great growth of the industrial centers in this country. The swimming pools in many rivers which where used by former generations have become, in many instances, so polluted with trade effluents and other matters that they have been entirely abandoned. Some of the earliest public baths to be constructed were unroofed and had a constant stream of water flowing through them, but their increased number and other considerations have made it necessary to economise the water supply, so that at the present time it is the custom to change the water only once or twice weekly. This being so, there is a danger of the baths becoming almost as polluted as the swimming pools of former days. Many efforts have been made, more or less successfully, to purify the water of swimming baths. The best known method of purification is, perhaps, that of Dr. Alexander, the medical officer of health of the metropolitan borough of Poplar, who for some time has made use of the electrolytic disinfectant fluid which he persuaded the borough council to manufacture some years ago. The fluid is placed in the public swimming baths in Poplar on successive days, and has been found both by chemical and bacteriological examination to purify the water very satisfactorily. In addition to the actual purification the water is far pleasanter to bathe in, is clear and invigorating, and free from the usual unpleasant odour associated with public baths.

In order to ascertain the effect upon the water of swimming baths of its constant use, Dr. J. Graham Forbes recently made an examination of the water in the small swimming bath at the London County Council industrial school in Goldsmith Street, Drury Lane. The result of this examination he reported to a meeting of the Medical Officers of Schools Association in February last. He found that there was evidence of skin contaminations shown by the presence in the water examined of *Staphyloccus pyogenes aureus, Epidermidis albus* and members of the *proteus* group; of organisms present in normal saliva and of faecal contaminations which largely predominated in the form of members of the *proteus* group, *B. coli communis, B. pyocyaneus* and *Streptococcus faecalis.* The results of Dr. Forbes' investigations are in accord with those of other observers and point to the necessity for definite action being taken by local authorities who have the control of public swimming baths. Dr. Alexander has apparently been successful in finding a remedy for the unsavoury and dangerous conditions shown to be associated with public baths, so that there should not be much difficulty in doing elsewhere what has been accomplished in the borough of Poplar. The advantages connected with free facilities for bathing and for swimming are so evident that it would be a pity if the researches of chemists should bring them into disrepute.''

The Medical Officer, June 29, 1912.

Carbon Monoxide from Slow Combustion Stoves.

Dr. H. W. Sinclair, the School Medical Officer of the Essex Education Committee contributes a short article on the heating of school rooms by the use of slow, closed, combustion stoves, burning coke, in the June 29 issue of the *Medical Officer.* The results of the investigation are summarized as follows:—

Our experiments prove that under certain conditions it is possible to detect in the air of rooms heated by slow combustion stoves a very small amount of carbon monoxide gas. The maximum amount even under such favourable conditions for the accumulation of the poisonous gas as existed in Series I., II., and III. of our estimations—namely the overheating of the stove and the absence of ventilation—did not exceed one part in 66,000. It is true that carbon monoxide is very poisonous, and that, even if only small amounts are present in the air, headache and loss of flesh may occur in persons exposed to the contaminated atmosphere for long consecutive periods.

In the *Journal of Physiology* (1886) Professor Haldane states that toxic symptoms were shown by persons when the carbon monoxide figures reached one part in 2,000. It is certain that the amounts found by us are so small as to be negligible as a possible cause of ill-health—since we found that under no circumstances of insufficient ventilation, etc., did the amount of carbon monoxide exceed one part in 30,000. In fact, the low readings of carbonic acid present in the air of unventilated stove-heated rooms establish the fact that the aspirating effect of the flue effectually causes the removal from the stove of the products of combustion. It is interesting to note further that, although the investigators were personally exposed for considerable periods to a temperature of about 90° F. in unventilated classrooms, we felt no bad effects that might be attributed to the stoves.

Is Baked Bread Sterile?

"In the *Zeitschrift für Hygiene und Infectionskrankheiten, Vol.* 69, 1911, there is an interesting article by B. von Fenyvessy and L. Dienes on the question whether bread is sterilized in the process of baking. It is usually assumed that the high temperature to which the dough is submitted insures this, various statements being to the effect that the inside of the loaf reaches 101° to 102° or more, the further assumption being that ordinary infectious diseases cannot be transmitted in this way.

"These two authors, therefore, set themselves to ascertain exactly what internal temperature loaves reach in the baking oven, and what class of organisms survive. After several experiments they concluded that (1) the internal temperature reached varied from 94° to 104 ; (2) that non-sporing pathogenic organisms which gain entrance accidentally into the dough are certainly killed; and that (3) dough contains mostly spores (of fungi) which are not killed by baking, and that it is therefore certainly not sterile. It is always possible that pathogenic organisms which produce spores may by means of these survive the baking process. It appears that so far no case of infection is recorded as having taken place this way."

Public Health, July, 1912.

Valuable Co-operation.

Commissioner Lederle has received and accepted, on behalf of the Department of Health of New York, an offer from the Committee for the Reduction of Infant Mortality of the New York Milk Committee to render valuable assistance to the Department of Health in the conduct of the work of the infants' milk stations. Under the plan of co-operation which has been arranged, the medical members of the Committee for the Reduction of Infant Mortality will visit the Municipal Infants' Milk Stations from time to time and make reports to the Department of Health in regard to the conduct of the work, and will give constructive suggestions for such improvements in methods as seem to them advisable. These reports will be submitted to the Department of Health in writing and will be followed by personal conferences if necessary.

The Committee will also render active assistance in the supervision and checking up of the records of the milk stations and collecting data for the purpose of reports and public statements. It will assign one or more persons capable of doing this statistical work and will actively co-operate with the Department of Health in the accumulation of useful and accurate data which may be made available periodically for the purpose of improved control of the work and the promotion of the highest efficiency.

The New York Milk Committee has already provided an Executive Secretary for the recently established Babies Welfare Association, the object of which is to bring about the highest possible degree of co-operation between private agencies and the Health Department in the work of reducing infant mortality. In addition to the services rendered by this Executive Secretary, the Committee will further assist the Department of Health in preparing material for publication and in carrying out plans for public meetings and exhibits of an educational nature.

Scientific Research for the Local Government Board.

"The President of the Local Government Board has authorized the following special researches to be paid for out of the annual grant voted by Parliament in aid of scientific investigations concerning the causes and processes of disease.

1. Further investigations (a) as to the distribution of tubercle bacilli in children having died between the ages of two and ten years, and the special characteristics of such bacilli; and (b) in collaboration with the General Register Office, on the incidence of different forms of tuberculosis in different parts of the country, according to age, sex, occupation and other conditions.

2. A continuation of a research into the causes of premature arterial degeneration in man by Dr. F. W. Andrewes, of St. Bartholomew's Hospital.

3. A joint investigation into the virus of poliomyelitis by Drs. F. W. Andrewes and H. M. Gordon, of St. Bartholomew's Hospital.

4. A continuation of an investigation into the micro-organisms known as non-lactose fermenters occuring in the alimentary canal of infants by Dr. C. J. Lewis, of Birmingham University, Dr. D. M. Alexander of Liverpool University, and Dr. Graham-Smith, of Cambridge University.

5. A continuation of the investigation by Professor Nuttall of Cambridge University on fleas and on the range of flight of the domestic and allied flies."

Public Health, July, 1912.

The Plague Situation in Porto Rico.

"On the request of the governor of Porto Rico the Public Health and Marine-Hospital Service has taken charge of the plague eradicative work in San Juan and vicinity in co-operation with the local sanitary authorities. Passed Assistant Surgeon R. H. Creel, an officer experienced in the laboratory and field work of plague eradication, has been placed in immediate charge. Officers have been detailed for plague duty in Porto Rico, and additional officers are on their way to San Juan.

The work being carried on includes the limitation of the disease to the island of the old city of San Juan. Measures are being taken to prevent the escape of rats across the bridges and also to prevent the possibility of their gaining access to vessels. The city has been divided into districts, and the houses in the infected territory are inspected daily. Infected houses are surrounded by rat-proof fences and then disinfected and freed from rats or destroyed. Special attention is being paid to the care and collection of garbage and other material which may serve as rat food. Steps are being taken toward the rat proofing of the entire water front. Trapping and poisoning of rats is being done. Special attention is being given to the laboratory examination of rats caught in parts of the city not known to be infected, in order to outline definitely the infected areas.

All the human cases with the exception of 8 have occurred in the old part of San Juan. Of the 8 occurring outside of the old city, 5 were in Santurce, a suburb of San Juan; 2 at Carolina, a town about 15 miles away, and 1 occurred at Arroyo, on a small schooner from San Juan. Of 4 rats caught in one of the houses at Santurce, in which a plague case occurred, 2 were found to be plague infected.

To prevent the further spread of the disease vessels clearing for other ports in United States territory have been made subject to the restrictions contained in paragraphs 35 to 40, inclusive, of the Quarantine Regulations promulgated October 20, 1910. This outgoing quarantine is being maintained with the assistance of the revenue cutter *Algonquin.*

Passed Assistant Surgeon Creel reports July 2: Two cases plague in Santurce July 1. Total to date: San Juan, 21 cases, 13 deaths; Santurce, 5 cases, 2 deaths; Carolina, 2 cases, 2 deaths.''

Public Health Reports, July 5, 1912.

The Danger of Petrol in Sewers.

"A grave warning under the head of 'Petrol in Sewers—a Modern Danger,' has been issued by the Manchester Rivers Committee regarding the discharging of petrol or other kindred spirits into sewers. The increasing use of petrol for motor vehicles, as well as for purposes of cleaning fabrics of various kinds, is occasioning a state of things to which it is important that public attention should be drawn. Instances are given where serious loss of life, both in Manchester and elsewhere, has occurred from the ignition of the very inflamable vapour discharge from petrol. It has been calculated that one gallon of petrol if vapourised into air, will produce something like 50 cubic yards of explosive mixture. A medium sized sewer, running half full would only require a gallon of petrol to produce sufficient vapour to blow up some 50 yards of the sewer. In these circumstances it is of the highest importance that the greatest care should be taken not only by the users of petrol in quantity, such as the proprietors of motor garages, etc., but also by the general public to avoid the discharge of even minute quantities of petrol or allied spirits into the sewers or drains, as these small quantities are liable to accumulate in gullytraps and in any portions of the sewers where the flow is inclined to be sluggish. No more petrol should be used at one time than can be spontaneously evaporated without nuisance or danger. It is dangerous to put even a cupful of petrol down the sewers, because it accumulates and very soon becomes a dangerous quantity. In New York the danger has become acute. The committee is contemplating putting up notices in all garages and elsewhere in order that the danger may be known."

The Lancet, Vol. 1, No. XXIV.

VOL. II. SEPTEMBER 1912 No. 9

AMERICAN
JOURNAL OF PUBLIC HEALTH

A QUANTITATIVE STUDY OF THE BACTERIA IN CITY DUST WITH SPECIAL REFERENCE TO INTESTINAL AND BUCCAL FORMS

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I. DUST AND DISEASE.

The bacteriology of dust and the relation between dust and disease have been discussed in two of the most notable books in the history of sanitary science. In Tyndall's "Essays on the Floating-matter of the Air" (1881), which is a literary classic as well as a masterpiece of scientific investigation, it was first demonstrated to the English speaking public in a comprehensive and yet popular fashion that the motes which give brilliance to the sunbeam are the bearers of living germs some of which may be the agents of infectious disease. In Prudden's little work on "Dust and Its Dangers" (1890), the same general facts were presented to the American public in so delightful a fashion that the last new edition of the book was issued twenty years after the first.

Ever since Tyndall's studies, and the basic work of Pasteur from which they drew their inspiration, the relation between dust and disease has been a fruitful subject for experimentation and perhaps a still more fruitful subject for debate. Epidemiologists have offered evidence in regard to outbreaks of various diseases in which the infection was held to be dust-borne; bacteriologists have checked the probability of such conclusions by experiments on the resistance of specific disease germs to drying and by studies of the actual germ content of dust deposited on surfaces and suspended in air.

The epidemiological evidence for dust-borne disease is admirably reviewed by Chapin in his "Sources and Modes of Infection" (1910). It is needless to go into the subject here except to point out that with the exception of anthrax, the evidence of infection by air or dust is practically *nil.* The case of anthrax is unique in the fact that the causative organism forms spores; and anthrax is undoubtedly spread among handlers of wool and hair by infected dust contained in those materials. Silberschmidt (1896) gives a good example of the spread of anthrax among horses from a hair factory, in part at least by aerial infection. With the exception of this disease, however, the recorded air epidemics appear to be simply epidemics in which water, food and direct contact with known cases of disease could not be shown to be at fault and in which the investigators therefore concluded that infection must have been transported in the air from a distance. With our modern knowledge of carrier cases this supposition appears quite needless and almost all the supposedly air-borne outbreaks are seen to present the usual features of contact or fly epidemics due to carriers or unrecognized cases. Not only is there no evidence that epidemics of disease are due to dust or air but there is a strong probability that even single isolated cases of disease are very rarely due to infection by way of ordinary quiet air. This conclusion may be drawn from the experience of numerous hospitals which have been operated with success in recent years on the principle that contact was the great danger to be guarded against and that air infection need not be considered. In the Pasteur Hospital in Paris, the Monsall Hospital in Manchester, the Minturn Hospital in New York and the new City Hospital in Providence various contageous diseases have been treated in open wards or in rooms opening on a common corridor with much less cross infection than is usual in a hospital with separate pavilions. Still more important and significant is the general agreement among surgeons that air-borne infection plays so small a part even in the causation of wound diseases. The streptococci and staphylococci of suppuration are known to be often present in the air and Lister's earliest antiseptic precautions were directed primarily against infection of this kind. Yet to-day it is universally recognized that contact infection is the principal danger of the operating room and that the dust in quiet air is a factor of little or no practical importance.

In view of this evidence and of much more which is summarized by Chapin (1910) in his epoch-making book, the conclusion seems to us obvious that the transmission of disease germs to any distance through the air of an ordinary quiet room is so rare a phenomenon as to be practically negligible. Infection may undoubtedly be spread by mouth spray thrown out in coughing, sneezing and loud speaking; but it appears that this infection is only considerable in amount in the immediate vicinity of the sick and is really more like a form of contact than true aerial infection (Winslow and Robinson, 1910). All this, however, does not necessarily close the question of dust infection under certain special conditions. It may be true that aerial infection is negligible in ordinary quiet air and yet infection may be carried to an appreciable extent when clouds of dust are blown about by winds in the street or stirred up indoors by the careless housewife. There is, so far as we are aware, no epidemiological evidence tending to show that disease is carried in this way but on the other hand such negative evidence as that of the hospital experience just cited does not bear in any way against it. In estimating the probability of such transmission we must at present fall back on bacteriological data.

Bacteriological evidence bearing upon this point is of two kinds, that which indicates the possibility of a given disease germ being present in dust, as shown by its ability to survive under experimental conditions, and that which shows the actual germ content of dust as it exists under natural conditions. Experiments on the capacity of various pathogenic bacteria to withstand drying have been made by many investigators and no attempt will be made here to review them with any completeness. Chapin (1910) has covered the ground with his usual thoroughness and those who wish to pursue the subject will find an excellent summary with original references in the "Sources and Modes of Infection." The results obtained by various observers are somewhat discordant, largely because of the varying conditions under which the experiments were carried out. Bacteria dried in a mass of feces or sputum may not be really dry at all, being protected by the drying of the outside of the mass, and under such conditions they live much longer than when dried in a thin layer on glass or when mixed with fine sand and dried upon its surfaces. The extent to which the organisms are exposed to light is an important factor and still another is temperature, the dried bacilli surviving much longer at low temperatures, as shown by Rosenau (1901) and others. We shall briefly refer here to a few of the more important results obtained by investigators who dried their bacteria in sand or earth so as to approximate somewhat the conditions that would obtain in the case of dust borne infection.

All observers are agreed as to the very low resistance to drying exhibited by the bacilli of influenza and plague, the microspira of cholera and the diplococcus of gonorrhoea. B. influenzae and D. gonorrhoeae under the most favorable conditions, when dried in sputum and in pus only survive from two or three to thirty-six hours (see Chapin, 1910). With regard to bubonic plague the work of Kitasato and Wilm (cited by Germano, 1897), of Germano himself (1897), of the German Plague Commission and Tidswell (cited by Chapin, 1910), of Rosenau (1901) and Buckley (1907) is reasonably concordant. In a moist condition the bacilli persist for considerable periods, (60 days, Germano, 1897; 125 days, Rosenau, 1901) and when dried on fabrics or in sponge they may survive for a long time (on fabrics for 30 days, Germano; in sponge at a low temperature for 125 days, Rosenau); as a rule however they perish quickly, particularly when dried in sand or earth or sawdust (5 days, Germano, 6 days, Rosenau). The cholera organism may live in the moist condition for 19 days (Buckley, 1907) or 30 days (Germano, 1897). Berckholz, (1889) records one case of extraordinary resistance (186 days for a culture dried on a thread in a dessicator) but most of his cultures perished in a few days. Manfredi (1891) records a survival period of 2 weeks when dried in a mixture of sweepings but he worked with unsterilized dust and his identification of his test organisms after isolation from it is exceedingly dubious. Gotschlich (cited by Chapin, 1910) found that cholera dejecta dried on clothing contained comma organisms after 36 days. All the other experimenters, Kitasato (1889), Uffelmann (1893), William (1893), Dempster (1894), Wittlin (1896), Germano (1897), and Buckley (1907), found that the comma organism could not survive drying for over four days, and often disappeared after a few hours.

The typhoid baccillus appears to be a little more resistant than these very sensitive organisms. Dried on wood or fabrics it survives for a considerable period, 85 days, (Uffelmann, 1894), 90 days, (Germano, 1897), 91 days (Buckley, 1907), 97 days (Pfuhl, 1902). Uffelmann records a survival period of 82 days in filter sand but as a rule drying in sand, earth, sweepings, etc., gives a much shorter period. Uffelmann himself found a maximum of 21 days in garden earth and 30 days in sweepings. Other observers report maximum periods of 5 days (Harrison and Harrison, 1904), 1–5 days, (Shattock and Dudgeon, 1912), 16 days, (Germano, 1897), 18 days, (Dempster, 1894), 25 days, (Firth and Horrocks, 1902), 28 days, (Pfuhl, 1902), one month, (Manfredi, 1891), and 49 days, (Martin, 1898). Manfredi's results are open to the objection noted above. In most of these experiments the bacilli usually disappeared in a much shorter time. Kirstein (1902) found that typhoid bacilli sprayed in the form of fine liquid droplets disappeared in 24 hours. Pfuhl (1902) found the dysentery bacillus much more sensitive to drying than B. typhi.

The diphtheria bacillus appears to have about the same resistance as the typhoid organism. Germano (1897) cites various workers who found that on surfaces and fabrics it could survive for three to five months. Hill (1902) found 9% of a series of infected glass rods still showing growth after 20 days while rods infected with tubercle bacilli lost their virulence under similar conditions in 16 days. On the other hand when dried in dust it succumbs more quickly and Flügge and Pernice and Scagliosi (cited by Chapin, 1910) maintain that it is killed out by the time it is dry enough to be blown about. Kirstein (1902) in the experiments with fine infected droplets to which reference has just been made, found that B. diphtheriae survived for 24–48 hours in diffuse daylight and for 5 days in a dark cellar. Germano (1897) working directly with cultures dried in dust reports survival periods of 16–50 days when dried in sand, earth, etc., in the room and of 20–60 days when the drying was carried out quickly in a desiccator. Buckley (1907), found the same difference in drying the bacilli on various surfaces. The maximum period varied from 6 to 41 days when the drying was done in the room and from 20 to 88 days when it was done in the desiccator. Reyes (1895), reports a longer survival period, 100 days, in cement powder, while in sand his culture lived only 14 days.

A third class of organisms, highly variable in resistance to drying, but on the whole distinctly hardier than B. typhi and B. diphtheriae, are the pathogenic cocci of various types. It is interesting to note that Pfuhl (1902) and Firth and Horrocks (1902) found the typhoid bacillus lived longer moist than dry; Dempster (1894) found typhoid and cholera organisms lived better moist than dry; Germano (1897) notes that plague, typhoid and cholera bacteria lived better moist than dry while B. diphtheriae survived equally well under both conditions; Buckley (1907) reports longer survival periods for B. pestis and M. comma in the moist condition while B. typhi and B. diphtheriae lived equally well in either case. On the other hand Germano (1897) found longer survival periods for the pneumococcus and streptococcus when dry than when moist and Buckley (1907) notes the same thing for the aurococcus and streptococcus. Wittlin (1896) however, reports a contrary result with the aurococcus.

With regard to the meningococcus and pneumococcus evidence is conflicting. Germano (1987) found his meningococcus alive after 80–90 days whether moist or dry and Jaeger (1899) reports a survival period of 127 days in pus dried on cloth. On the contrary Chapin (1910) cites Councilman, Albrecht and Ghon, Bettencourt and Franca, Kache, Kutscher, Flügge, and Arkwright, all of whom found the meningococcus would not survive drying for more than 9–72 hours and Lingelsheim who could only keep it alive in sputum for 5 days. It seems probable that the earlier workers did not use the true meningococcus. For the pneumococcus Germano (1897) quotes Foà and Bordoni-Uffreduzzi as finding a survival period of 45 days and Guarnieri, periods varying between 90 and 120 days. Pastella records a lower resistance and Kruse and Pansini noted great variation between different strains, (Germano, 1897). Germano's own results bear out the latter assumption. One strain dried in earth, sand, etc., lived as a rule only 2 days, the longest period being 8 days in an experiment carried on at 0°. On the other hand another strain lived from 30 to 75 days under similar conditions. This strain however appears from the author's description to be nearer the streptococci than the pneumococci. Other supposed pneumococci lived in dried blood for 3–5 days and dried pus for 12–16 days and pneumonic sputum contained the organism in a virulent condition after 12–16 days when moist and 16–140 days when dry.

Dubious and puzzling as these results in regard to the diplococci appear to be, there is no doubt at all as to the high resistance of the other cocci belonging to the genera, Aurococcus and Streptococcus. Haegler (1892) dried pus on cloth and powdered it and found the aurococcus alive after 56–100 days. Buckley (1907) reports the aurococcus as surviving for 35–140 days on surfaces whether dry or moist. Shattock and Dudgeon, (1912) give a survival period of 21–84 days when dried on glass. Manfredi (1891) found it alive after 1 month in dried street dust but his experiments as noted above are of doubtful accuracy. Wittlin (1896) mixed a culture with street dust and recovered the aurococcus after 30 days when moist, after 3 days dry in direct light and 6 in diffuse light. Kirstein (1902) found the organism alive after 8–10 days in fine droplets in the diffuse light of a room and after 35 days in fine droplets in a dark cellar and after 28 days in fine dust in the room. Buckley, Kirstein and Shattock and Dudgeon found it more resistant to drying than B. typhi, Buckley and Kirstein more resistant than B. diphtheriae, Buckley more resistant than B. pestis and M. comma, Haegler more resistant than the streptococcus and Kirstein more resistant than the tubercle bacillus.

For streptococci Haegler (1892) found a survival period of 14–36 days for pus dried on cloth and then powdered. Germano (1897) cites the results of earlier workers, (Pasquale, Lingelsheim) as giving periods varying between a few days and many months under various conditions. Germano himself worked with three different strains dried in sand, earth, etc., and found that one lived when moist only for 5–30 days and when dried in the room for 20 40 days. The other two survived drying for 50 and 60–120 days respectively. Kirstein (1902) reports that in fine spray streptococci lived 10 days in the diffuse light of a room and 38 days in a dark cellar. They were more resistant than B. typhi, B. diphtheriae and B. tuberculosis under these conditions.

M. melitensis resembles the pus cocci, to which it is related, in somewhat high resistance surviving 16 days dried on cover slips, 20 days in sand, 80 in fabrics and 27 in dry soil, (Horrocks, 1905).

More attention has been paid to the bacillus of tuberculosis in drying experiments than to any other organism, ever since Koch (1884) in his classic paper quoted an experiment by Fischer and Schill in which it survived drying for 186 days and urged the importance of dust as a means of spreading infection in this disease. Cornet (1889) attracted the attention of hygienists to the problem of dust infection and Flügge and his pupils, Neisser, Beninde, Sticher, Heymann, and others, in many papers published in the Zeitschrift für Hygiene (Volume XXVII, XXX, XXXVIII) confirmed Cornet's main contention that tuberculous sputum, dried and reduced to powder, could cause tuberculosis when inoculated, ingested or inhaled. The earlier workers were able to show a very high resistance for the tubercle bacillus when dried on surfaces or fabrics. Chapin (1910) cites many observations in which the survival period ranged between 1 and 9 months. Manfredi (1891), this time making inoculation experiments, found tubercle bacilli alive in street dust after 2 months. Stone (1891) dried sputum in a jar and after keeping it for three years found it still virulent, though only slightly so. Later workers, as in the case of the pneumococcus, report more moderate survival periods. Hill (1902), even with cultures dried on glass, found the tubercle bacilli gone after 16 days. Kirstein (1902) reports that in fine spray they live 5 days in the diffuse light of a room and over 22 days in a dark cellar. In fine dust he found them alive after 3–14 days (Kirstein, 1905). Cadéac (1905) found sputum dried on glass and marble and kept in diffuse light would remain virulent for 10–14 days. Kuss (1908) found that sputum dried in a thin layer would remain virulent in the dark for 40–45 days and in diffuse light for 20 days while dried in dust it remained virulent for 17 days.

Conditions differ so much in different experiments that it is somewhat hard to compare them. Exhaustive studies of several species under comparable conditions have however been made by Germano (1897), Neisser (cited by Chapin, 1910), Kirstein (1902) and Buckley (1907). Germano and Neisser dried the bacteria in dust, Buckley dried them on surfaces and Kirstein suspended them in fine spray. Germano placed the cholera, plague and typhoid organisms in the least resistant class, B. diphtheriae, the streptococci and some penumococci in an intermediate group and the meningococcus and some pneumococci as most resistant. Neisser concluded that cholera, plague, typhoid, diphtheria, and pneumonia could not be dust-borne, while the meningococcus, the pus cocci and the tubercle baccillus might be carried in dust. Kirstein found the typhoid and diphtheria organisms least resistant, the tubercle bacillus more so and the aurococcus and streptococcus most resistant. Buckley found that B. pestis and M. comma perished quickly when dried while B. diphtheriae and B. typhi were more resistant and the aurococcus most so. Reviewing all the evidence it seems clear that the spread of cholera and plague, influenza and gonorrhoea in dust is practically impossible and that of typhoid fever and diphtheria possible though not probable, while the tubercle bacillus and the pus cocci are the forms most likely to be spread in this way. The resistance of the pneumococcus and the meningococcus seems to be in some doubt. All bacteria (except perhaps spore formers) seem however to suffer a more or less rapid reduction in drying. Thus Manfredi (1891) found the general average of bacteria in street dust to be 716,521,000 while after dry weather it fell to 57,555,143. Mazuschita (1899) found general averages in street dust of 589,857–1,204,948 reduced after 26 days of dry weather to 37,250–97,333. The most interesting of such experiments is that of Miquel who put house dust originally containing 740,000–760,000 bacteria away for 17 years and at the end of the time found that the number had fallen to 45,000–60,000.

This quantitative reduction is an important point to bear in mind in estimating the significance of such drying experiments as have been quoted above. The reduction of bacteria exposed to unfavorable conditions is always a gradual process, rapid at first and then very slow. It has been worked out in great detail for the life of pathogenic bacteria in water. Drying experiments have usually not been quantitative. Germano made a few counts but in most cases his quantitative data are too imperfect to give a measure of the rate of reduction. In one case however he gives the detailed counts tabulated below:

TABLE I.

Rate of Reduction of Diphtheria Bacilli in Dust.

(Germano, 1897.)

	Coarse Dust.	Fine Dust.
Control	400,000	500,000
1 day	16,000	25,000
2 days	14,000	17,000
5 days	Few	7,500
7 days	400	2,150
9 days	Few	1,300

In recent unpublished work by Abramson and the senior author it was found that when colon bacilli are dried in sand 99% perish in 24 hours while some persist for several weeks. This quantitative reduction may of course make the danger of infection from a practical standpoint negligible long before the last resistant minority of disease bacteria have disappeared. Bacteria which are completely eliminated in ten days or two weeks are probably 90% gone in a few hours.

II. PREVIOUS INVESTIGATIONS OF THE BACTERIOLOGY OF DUST.

The bacteriological examination of dust is closely connected on the one hand with the study of the bacteria in air and on the other hand with the investigation of fomites of all sorts for the detection of pathogenic bacteria. Air bacteria are in the main dust bacteria and the number of bacteria in the air varies with the amount of dust contained in it. Maximovitch (1894) quotes Tenon as finding a count of 1500–2000 bacteria per cubic meter of quiet hospital air raised to 466,000 after sweeping and cites an experiment by Hesse in which 2000 bacteria per cubic meter were present in the air of a class-room before the class arrived, while he found 15,000 during the hour and 35,000 just after the class had left. Russell (1899) found that in a cow stable 12,000–42,000 bacteria fell on a 12 inch plate while bedding was going on and only 483–2370 an hour afterward. J. A. Rockwell in an unpublished investigation carried out in 1896 in the laboratories of the Massachusetts Institute of Technology found a count of 56,300 bacteria per cubic meter in street air suddenly raised to 20,000,000 by a dust cloud. Many observers like Prudden (1890) have limited themselves to the study of the dust suspended in the air. We have not attempted in our survey of the literature to review investigations of this character, since on the qualitative side the isolation of pathogenic germs from the air has been confined to the pyogenic cocci except in a very few instances and since on the quantitative side the data obtained are not comparable with those derived from the study of deposited dust. We have confined ourselves to the studies which have been made of dust itself, either scraped up in bulk or wiped off from surfaces by the use of moist swabs. It is of course obvious that the bacteria may in some cases have been present on the surfaces or in the dust in question in a condition of incomplete dryness and this possibility cannot be entirely excluded.

So far as the isolation of specific pathogenes from dust is concerned, the results appear to be about what should be expected from the drying experiments cited above. The least resistant organisms, D. gonorrhoeae, B. influenzae, B. pestis and M. comma have never been isolated from dry dust. Zelenev (1895) claims to have found the microspira of cholera in one out of fifteen samples of dust swabbed from hospital tables in the cholera ward during an epidemic but if his organism really was M. comma it may, of course, have been recently deposited on the table in the form of fresh fecal pollution. With regard to the typhoid bacillus too, evidence of persistence in dust is almost entirely negative. Verdozzi (1908) quotes Kelsch and Simonin, Santori and Faelli, Sanglé Ferrierè and Remlinger as having isolated B. typhi from dust. Solovieff (1895) thought he found it in the dust of a hospital storehouse. So far as we are aware, however, no one has claimed to have done so in recent years and anyone familiar with the difficulties of separating the typhoid bacillus from related forms may well be sceptical as to any isolation not confirmed by serum reactions. Isolation of the colon bacillus from dust has been reported by Solovieff (1895), Kirchner (1896), Kelsch and Simonin (1898) and Kinyoun (1905) and our own results show that it is very abundant in both indoor and out door dust. Attempts to isolate the diphtheria organism have been more generally successful than in the case of typhoid fever. Weichardt (1900) obtained three positive results in the examination of 300 swabs from sick rooms while 250 swabs from other parts of the house were all negative. Hill (1902) found 4 positive results out of 532 swabs from the neighborhood of the sick.

Kinyoun (1905) reports the isolation of B. diphtheriae from dust rubbed off from railway furniture. Renney (1905) obtained it from the dust on the top of a door. Chapin (1910) cites Richardiere and Tallemer as finding B. diphtheriae in the dust of a diphtheria ward, and Chapin himself reports negative results from 200 swabs. In all these investigations, except Renney's, the infection picked up by the swab may apparently have been rather fresh and not really in the form of dust.

Investigation in regard to the presence of the tubercle bacillus in dust have been carried out on an exhaustive scale by many observers, since Cornet first emphasized the danger of dust infection in this disease. The dust, collected in pincers or sterile spatulas, or swabbed off surfaces with sterile swabs, has usually been suspended in water and injected into guinea pigs. A considerable proportion of the animals so treated generally die within a few days as a result of pyogenic or septic bacteria in the dust and these animals must of course, be excluded from consideration. Another source of confusion lies in the fact that sometimes several animals are inoculated with one sample of dust while in other investigations a number of samples of dust are mixed for injection into a single animal. Thus the work of Hill (1902) is often quoted as indicating a very small proportion of positive results. It is said that he collected 676 swabs and obtained only 9 positive results; but as a matter of fact the 676 swabs were so mixed as to be injected into 59 guinea pigs of which 24 died of other infections. As a fact therefore 35 guinea pigs were really available for the test and 9 or 27% were tuberculous. To avoid this confusion we have tabulated the results obtained by the principal observers in the form on p. 673, showing first the total number of animals tested, second the proportion dying prematurely of diseases other than tuberculosis and third the proportion of the animals surviving these infections which later developed tuberculosis. This form of tabulation ignores entirely the number of samples examined but as the amount of dust used varied with the different investigators, and was quite indefinite with most of them, this is of no importance. Some idea of the amount of dust used may perhaps be gained from the mortality from other diseases, ranging from 10 to 60%. In making up our tabulation we have excluded all cases in which the diagnosis of the tubercle bacillus was made by microscopic examination only.

The results are on the whole remarkably concordant considering the chances for error in such work. The dust from the neighborhood of consumptive patients appears to give positive results in 20–50% of the animals infected, while in dust from places not specially

TABLE II.

Tubercle Bacilli in Dust from the Neighborhood of Tuberculous Patients.

Observer.	Source of dust.	Number of animals.	Percentage of animals dying of other infections.	Percentage of surviving animals dying of tuberculosis.
Hance, 1895	Sanatoria	90	10	7
Wagner, 1903	Hospital	40	10	8
Heymann, 1901	Hospitals and sick rooms	371	18	18
Zelenev, 1895	Hospital tables	39	13	26
Friberger, 1908	Clothing	33	42	26
Hill, 1902	Hospitals and sick rooms	59	44	27
Cornet, 1889	Hospitals	145	51	35
Coates, 1901	Clean infected houses	20	15	35
Cornet, 1889	Private sick rooms	170	54	43
Maximovitch, 1894	Hospital floors	21	19	53
Coates, 1901	Dirty infected houses	52	29	53

TABLE III.

Tubercle Bacilli in Dust Not Exposed to Pollution from Tuberculous Patients.

Observer.	Source of dust.	Number of animals.	Percentage of animals dying of other infections.	Percentage of surviving animals dying of tuberculosis.
Cornet, 1889	Dirty non-infected houses	77	40	0
Solovieff, 1895	Hospital store-rooms	57	40	0
Kelsch, Boisson, Bräun, 1898	Barracks	122	40	0
Coates, 1901	Dirty non-infected houses	20	30	0
Gotschlich (cited by Chapin, 1910)	Railway stations, etc.	119	?	0
Kinyoun, 1895	Railway cars	174	26	2
Heron and Chaplin, 1894	General hospitals	100	27	3
Petri, 1894	Railway cars	208	35	4
Manfredi, 1891	Street	82	48	7
Kirchner, 1895	Barracks	42	60	6
Hance, 1897	Tenements, cars, etc.	67	30	15
Prausnitz, 1891	Railway cars	20	20	31
Kirchner, 1896	Barracks	14	36	33

exposed to pollution the proportion of positive results is almost always under 10% and in two-thirds of the cases under 5%. The two high results reported by Prausnitz (1891) and Kirchner (1896) represent a very small number of animals (5 positive results in Prausnitz's case and 3 in Kirchner's). The comparative work of Cornet and Coates is particularly significant. Cornet found 43% of the animals which survived septic infection tuberculous in dust from rooms occupied by tuberculosis patients, 35% in dust from tuberculosis hospitals and none in various places not exposed to infection. Coates (1901) found 53% positive results in dirty infected houses, 35% in clean infected houses and none in dirty non-infected houses.

In dust from almost any source there is apparently more or less likelihood of finding some virulent tubercle bacilli. It is difficult to make any estimate of their quantitative distribution, however, since no record has been made by most observers of the amount of dust infected. Prausnitz (1891) suspended 400 mg. samples of dust from railway carriages in 10–15 cc. water and used 1 cc. for infection; 16 animals survived septic infections and 5 developed tuberculosis. This would indicate about one tubercle bacillus in 100 mg. dust. Verdozzi (1908) used 5 mg. samples of library dust and found tubercle bacilli in one sample out of 9. This would give one tubercle bacillus in 45 mg. dust. Le Noir and Camus (1909) found that they had to use 150 mg. of dust from a hospital ward to cause tuberculosis. So it is evident that B. tuberculosis may be present in dust from various sources to the number of five or ten to the gram.

The pyogenic cocci of various types have also been isolated from dust by numerous investigators. Germano (1897) and Chapin (1910) cite numerous cases in which both the aurococcus and the streptococcus have been found in air, and very many of the guinea pigs which died in the early days in the studies made to isolate tubercle bacilli from dust were infected with these organisms. Aurococci have been isolated from dust by Turina, 1890; Manfredi, 1891; Maximovitch, 1894; Solovieff, 1895; Zelenev, 1895; Kirchner, 1896; Mazza, 1897; Kelsch and Simonin, 1898; Mazuschita, 1899; Kinyoun, 1905; and many others; 5–10% of the animals injected usually showing infections of this type. Streptococci have been found in dust by the first five of the observers just quoted as finding the aurococcus; by Mazza, 1897; Ucke, 1897; Kelsch, Boisson and Braün, 1898; Kinyoun, 1905; and many others.

A number of bacteriologists report the finding of pneumococci in dust. Three Russians, pupils of Tchudnovsky's, all report finding this organism a number of times in dust from hospital floors, storehouses and tables (Maximovitch, 1894; Solovieff, 1895; Zelenev (1895). Netter (1897) isolated it twice from hospital dust and Mazza (1897) found it several times in dust from restaurants. Washbourn (1902) found it in dust from a hospital ward and from a laboratory. Tirelli and Ferrari-Lelli (1903) found it in house dust and Kinyoun (1905) a number of times in dust from railway cars. There are, of course, many cocci more or less intermediate between the true D. pneumoneæ and the streptococci and all that most of these experiments mean is that the dust contained a diplococcus that behaved in general like the D. pneumoneæ. Many of them were probably related forms like those which gave the long periods of resistance to drying in Germano's and other experiments.

It is scarcely necessary to point out that spore bearing bacilli like the organisms which cause anthrax, tetanus and malignant œdema will survive drying for long periods and can be found at times in dust. For anthrax, Page (1909) cites Andrewes, who found anthrax spores in dust shaken out of a bale of Chinese hair, Webb and Duncan who found anthrax bacilli in two samples of dust shaken out from large quantities of hair, Stewart who isolated the bacillus from a Bombay hide and Eurich, who obtained negative results from 600 samples of clean wool, hair and dust, while 14% of the blood-stained specimens examined gave positive results. Page himself obtained negative results from 83 samples of bristles, hair and dust. Grusdeff (1891) reports anthrax in the dust from a railway car and Solovieff (1895) thought he found it in a hospital store-room. Manfredi (1891), Tirelli and Ferrari-Lelli (1903), Kinyoun (1905) and others have found the bacilli of malignant œdema in dust.

So far as non-spore forming pathogenic bacteria go there is convincing evidence of isolation from dust in the case of the diphtheria bacillus (a very few instances) the tubercle bacillus and certain cocci. Whether the latter should be called pathogenic or not is a question largely of terminology. If one calls everything pathogenic that kills an animal when injected under the skin, of course they are pathogenes. From the public health standpoint, however, such a use of the word is meaningless. Colon bacilli and aurococci are usually pathogenic in this sense, but they are normal inhabitants of the human skin and intestinal tract, they do not cause disease when inhaled or ingested and, except as indices of something else, have no significance as to the wholesomeness of the substance in which they are present. The streptococci and the diplococci, more or less closely resembling the pneumococcus, are in a somewhat different position. Some of these organisms undoubtedly do at times cause nose and throat diseases and others are harmless saprophytes of the nose and throat. We are not at present able to distinguish between the two types. The danger of transmission of disease bacteria in dust appears therefore to be confined to diphtheria, tuberculosis and certain obscure nose and throat diseases. Diphtheria bacilli are rarely present in dust, and tubercle bacilli and streptococci and diplococci rather commonly present, but it is not certain whether these streptococci and diplococci (though virulent when injected into the body) are anything more than harmless saprophytes under ordinary condition of ingestion and inhalation. It should be noted that Neustaedter and Thro (1911) have recently produced anterior poliomyelitis by the injection of dust from a sick-room which thus apparently contained the unknown ultra-microscopic organism of that disease.

In contrast to these numerous studies of pathogenic forms in dust, determinations of the number of bacteria present, pathogenic or not pathogenic, have been few and far between. Tirelli and Ferrari-Lelli (1903) and Kinyoun (1905) made indirect determinations by stirring up the dust by sweeping, beating furniture, etc., aspirating the dusty air and studying its content. The Italian observers found numbers ranging between 118 and 20,352 per liter in one series and between 32 and 29,372 in another. Kinyoun in working with the dust stirred up from carpets in railway cars found 100 to 714 per liter. These figures are of course, however, only roughly quantitative since the dust beaten up into the air was uncertain in amount.

In another series of observations dust was swabbed off from a measured surface of floor, wall or furniture and the bacteria found expressed as so many per square meter. Petri (1894) examined the interior of railway cars of different classes and found the following results:

TABLE IV.

Bacteria in Dust on Surfaces in Railway Cars (Petri, 1894).

Number per Square Meter.

Class.	Floor.	Ceiling.	Walls, seats, etc.
I.	258,300	3,900–24,200	4,600– 44,900
II.	434,700	100	2,900– 55,900
III.	548,100	300–1,100	5,900–280,000
IV.	1,262,400	1,000	16,100– 26,460

The three Russian observers, Maximovitch (1894), Solovieff (1895) and Zelenev (1895) found considerably higher numbers in their studies of hospital dust as indicated in the table on p. 677; and this is not surprising in view of the infrequent cleaning which they describe as being in force at the hospital studied.

Actual quantitative determinations of the number of bacteria in a given weight of dust began with Miquel, who used the dilution method for studies of this kind in the very early days of bacteriology. In dust deposited on a paper in the library at Montsouris (Miquel 1881), he

TABLE V.

Bacteria in Dust on Surfaces in Russian Hospitals.

Number per Square Meter.

Observer.	Source of dust.	Minimum.	Maximum.	Average.
Maximovitch, 1894...	Floor of wards...........	11,310,000	34,340,000	22,750,000
	Floor of corridors.........	30,490,000	289,640,000	158,830,000
	Floor of toilets...........	29,080,000	52,720,000	35,900,000
Solovieff, 1895.......	Clothing store-room 1, shelf	69,740,000	246,270,000	167,435,000
	“ “ 2, “	160,800,000	579,200,000	411,800,000
	“ “ 3. “	35,600,000	109,470,000	87,535,000
	“ “ 1, floor	74,140,000	155,470,000	123,103,000
	“ “ 2, “	160,270,000	352,800,000	273,475,000
	“ “ 3, “	5,340,000	90,540,000	72,824,000
Zelenev, 1895........	Hospital tables, painted...	3,760,000	20,746,000	9,260,000
	Hospital tables, oilcloth...	17,492,000	138,266,000	55,640,000

found 740,000 and 760,000 bacteria per gram and twice as many other organisms (molds, etc.) capable of forming a surface growth on broth (Miquel, 1897). In rooms at Paris he found 1,300,000 and 2,100,000 bacteria per gram in similar samples, (Miquel 1883); and it is interesting to note that he was impressed with the large proportion of cocci present (25% at Montsouris, 60% and 75% in the Paris samples). Earth showed a much smaller proportion, only 5% (Miquel, 1881). Later determinations of the bacteria in house dust have been made by several Russian and Italian observers. Maximovitch (1894) records 66,130,000 per gram in the dust from the floor of a hospital corridor. Mazza (1897) found 1,580,000, 1,950,000, 2,060,000, 2,520,000 and 3,170,000 bacteria per gram in the dust of five different coffee-houses. Maréchal (1906) reports very high numbers in nine samples of vacuum cleaner dust. Individual counts for bacteria ranged between a minimum of 642,857 and 11,000,000,000 and averaged 2,023,000,000; for molds, the minimum was 71, 428, the maximum, 4,333,333,333, and the average, 1,297,000,000 per gram. Verdozzi (1908), on the other hand, examined four samples of vacuum cleaner dust from the Biblioteca Angelica in Rome and found, respectively, 90,000, 170,000, 673,000 and 1,814,000 bacteria per gram. Most of the organisms present were spore forming rods, the cocci coming next in abundance. The very high counts obtained by Maréchal are so remarkable as to excite the suspicion of possible analytical error. Delay in plating after the suspension of the dust in water might easily lead to a multiplication which would give excessively high numbers.

Street dust, or street sweepings, has also been studied by several observers from the quantitative standpoint. Uffelmann (cited by Manfredi, 1891) found 2,000,000 to 40,000,000 bacteria per gram in street sweepings at Rostock and 8,000 to 12,840,000 (average, 3,000,000) at Monaco. Manfredi himself in the examination of sixty samples of street dust at Naples found a general average of 716,521,000 per gram, with a maximum of 6,688,000,000 and a minimum of 910,000. A surprisingly small proportion of these organisms were spore formers. The average for this group was 190,000 with a maximum of 4,500,000 and a minimum of 750. After a long period of dry weather the average for total bacteria fell to 57,555,143 with a maximum of 160,000,000 and a minimum of 910,000. Mazuschita (1899) made a careful study of the dust in sixteen streets, eight of which were sprinkled and eight were not. The averages or each of the sixteen streets are given below:

TABLE VI.

Bacteria in Street Dust (Mazuschita, 1899).

Number per Gram.

Sprinkled streets	1,945,750	56,000	2,211,500	180,000	281,000	97,333	4,697,333	170,666
Unsprinkled streets	1,563,750	192,666	1,825,000	112,500	70,000	37,250	440,500	84,000

The general average for the sprinkled streets was 1,204,948 and for the unsprinkled streets, 589,857. After 26 days of dry weather the numbers fell to 97,333 for the sprinkled streets and 37,250 for the unsprinkled. Ernst (1900) records the low value of 80,000 per gram for one sample of street dust.

III. METHODS USED IN THE PRESENT INVESTIGATION.

Over 150 samples of dust were obtained for our investigation from a considerable variety of sources, indoors and outdoors, within the limits of the city of New York. In general the samples may be classed under four heads, street dust, house dust, school dust and vacuum dust. The street dust was collected from sidewalks or pavements, the house and school dusts from shelves, tops of furniture and from the floor, the vacuum dust from the second dust chamber of the vacuum cleaner used in exhibition halls and store rooms of the American Museum of Natural History. The street dust obviously included two principal elements, inorganic and organic. The heavy mineral portion was made up of sand and other detritus from the grinding up of pavements and soil, ashes and the detritus produced from stone, plaster, cement, iron and other building materials. The organic portion was largely pulverized horse droppings and showed the fragments of seeds and vegetable matter characteristic of such material.

The house and school dusts were much lighter and made up either of very finely divided particles or of fuzzy fibrous masses apparently including textile debris. The vacuum dust was similar to the shelf and furniture dusts.

Samples were collected in small sterile test tubes. When dust was abundant, as in the street, the tube was used as a scoop. When the dust was scanty, as on shelves and furniture, it was brushed into the tube by the use of the sterile cotton plug with which the tube had been closed. Samples varied in amount from .1 gram to several grams.

From each sample a portion, varying from .1 gram to 1 gram, was weighed out on sterile filter paper, thoroughly shaken up in sterile water and diluted for plating in the usual manner. There must of course be a considerable sampling error in this process and the final results show only those bacteria which were separated from the dust particles.

The numbers of bacteria were determined by plating on standard lactose agar, made up with meat, 1 per cent pepton and 1 per cent lactose and adjusted to a reaction neutral to phenolphthalein; 20° counts were made after five days and 37° counts after two days. These plate counts were checked on 22 samples by determining total numbers at 20° by a dilution method, as it was thought that dried bacteria might in some cases fail to develop on solid media. One per cent lactose broth was used for this purpose and was inoculated with each decimal dilution from $\frac{1}{1000}$ gram to $\frac{1}{10.000.000}$ gram. For determining the number of aerobic spores the same liquid dilution method was used, the tubes being heated at 175°–180° for ten minutes to destroy vegetative cells. Liquid cultures were kept at 20° for seven days unless growth appeared sooner.

Aside from this determination of spore formers quantitative tests were made for two special types of organisms as indicators of intestinal and buccal pollution. For the former the colon bacillus was used although it must be understood that since the colon bacillus is found in the feces of the horse it is equine, and not human, pollution that is indicated by this organism in city dust. For determining the colon bacillus the presumptive test in lactose bile was used. Numerous investigations made in the study of water bacteriology have shown that the results of this test coincide closely with those obtained by more elaborate methods and it is quite useless to carry out the old process of separation and identification except in special studies of an elaborate nature. In our work the test for the colon bacillus was made by inoculating three tubes of 1 per cent lactose bile with each of three centesimal dilutions, usually of $\frac{1}{100}$, $\frac{1}{10000}$ and $\frac{1}{1.000.000}$ gram. Tubes showing gas production after seventy-two hours at 37° were considered positive. If a single tube only was positive in the $\frac{1}{100}$ dilution the number of colon bacilli was recorded as 33 per gram, and similar records were made for the higher dilutions.

For a test of mouth pollution the acid forming streptococci were used. The whole group of the streptococci is characteristically parasitic in origin (Winslow and Winslow, 1908), being commonly found in the mouth and intestine of warm-blooded animals and in other habitats, only as they are polluted with human and animal discharges. The significance of the lactose fermenting streptococci, in particular, has been well established. In water (Prescott and Winslow, 1908) and shellfish (Clark, 1906) these organisms are usually found only in the presence of fecal pollution. Their special importance for our purpose lies in the fact that as shown by Andrewes and Horder (1906) and Winslow and Palmer (1910) they are rare in the feces of the horse. While colon bacilli are common to human, bovine and equine feces, and acid-forming streptococci are found abundantly in the human throat and in human and bovine feces the common streptococci of horse feces do not attack lactose. In the study of city dust, therefore, these organisms may be used to differentiate pollution from the human mouth from that derived from horse droppings. Gordon (1903) found streptococci capable of fermenting lactose present in from one-millionth to one-hundred-millionth of a cubic centimeter of saliva. The commonest form was Str. brevis which clots milk, forms acid in dextrose and lactose broths, does not liquify gelatin, grows better at 37° than at 20° and is non-virulent. In a long series of experiments he found only two tests out of 168 for acid-forming streptococci positive in the air of a quiet room where speaking had not been going on while at various points around a person speaking or reading with vigorous enunciation 68 out of 168 tests were positive. Outdoor air in London showed acid-forming streptococci in only one out of 10 50-liter samples while 7 of them contained the non-acid forming streptococcus characteristic of horse feces. Five broth plates exposed for an hour and a half gave the acid-former twice and the other type four times. In country air 11 samples totalling 1000 liters gave no acid-forming streptococci and 2 of the non-acid type and 13 broth plates gave only 3 acid-formers. Andrewes (1907) reviews the results of his own and Gordon's studies of air streptococci and shows that of 64 recorded strains 65% were of the Str. brevis type. It seems clear from this work and from all that we know of the habitat of the lactose-fermenting streptococci that when found in city dust these organisms may be taken to be indicators of bucal pollution from human beings.

In our own work fifty samples of dust were examined for these acid-forming streptococci. Plates were made for this purpose on litmus-lactose-agar at 37° and suspicious colonies were fished and subcultured. At the same time that the original plates were made lactose broth tubes were inoculated with decimal dilutions from $\frac{1}{1000}$ gram to $\frac{1}{100,000}$ gram and incubated at 37° for three days to allow the streptococci present to overgrow other forms producing less acid. After three days, if the direct plates had not yielded streptococci, litmus-lactose-agar plates were streaked from the lactose broth tubes and this method sometimes yielded streptococci which were overgrown on the plates. Even so, however, streptococci must no doubt often have been lost and no attempt was made to find them in portions larger than $\frac{1}{1000}$ gram. Negative results do not mean, therefore, that no streptococci were present; but only that none were isolated from $\frac{1}{1000}$ gram portions. All the cultures isolated were examined under the microscope and cultivated on litmus-lactose-agar slants to observe the acid production and habit of growth. Only those forms were considered positive which showed spherical cells occurring in chains of at least four elements and which produced the characteristic veil-like or scanty growth on lactose agar and strongly acidified the medium. The microscopic examination often showed variations in form from true cocci to elongated oval forms but this is always characteristic of the mouth cocci shortly after isolation. Again it must be understood that by "streptococci" we do not mean that the organisms occurred in long coiled chains with no other groupings. Sometimes this was the case, and one culture showed all the morphological and growth characters of the Streptococcus conglomeratus of Kurth. Usually, however, there were pairs and more or less irregular groups, as well as chains, although the tendency to chain formation was always clearly present. This again is characteristic of the mouth streptococci and the term "streptococcus" is applied by us to organisms having such morphology combined with meager surface growth and strong acid production in the sense in which it is used by Winslow and Winslow in the "Systematic Relationships of the Coccaceae.''

In order to be sure of the acid producing power of the streptococci, we checked the somewhat uncertain litmus reaction by cultivating 34 of the strains, isolated from 27 samples, in lactose broth for three days at 37° and determining the amount of acid produced by titrating two duplicate tubes of each, using phenolphthalein as an indicator and subtracting the acidity of inoculated controls. The results are shown in the table below and they indicate that all the cultures tested belonged to the lactose-fermenting class.

TABLE VII.

Acid Production of 34 Strains of Dust Streptococci in Lactose Broth.

Acidity classes, per cent. normal acid produced.	1.6–2.0	2.1–2.5	2.6–3.0	3.1–3.5	3.6–4.0	4.1 and over.
Number of strains in each class. . .	5	8	7	8	4	2

IV. RESULTS AS TO THE NUMBER AND KINDS OF BACTERIA IN NEW YORK CITY DUST.

Total Counts on Plates at 20°. The total counts obtained by plating on lactose agar at 20° are shown in the fourth column of Tables VIII–XI and in Diagrams I and II. Individual counts range from 150,000 bacteria per gram (sample 17 from a window sash in the library of the American Museum) to 145,000,000 (sample 95, street dust from the corner of Grand and Essex Streets). The indoor dusts (house, school and vacuum) were generally under 20,000,000, the street dusts usually over 20,000,000 (see Diagram II). The average for house dusts was 5,500,000, for vacuum dusts

TABLE VIII.

Bacterial Content of School and Museum Dusts.

No. of sample.	Source.	Date.	Bacteria per gram.		
			Agar 20°.	Agar 37°.	B. coli.
3	College Corridor 3rd floor........	18-2-11	170,000	——	4,000
5	College concourse...............	4-3-11	1,500,000	800,000	60,000
17	Museum library window sash	14-6-11	150,000	300,000	33
18	Museum corridor case. (E. hall)...	"	350,000	330,000	100
19	Lab. shelf dust.................	"	550,000	——	100
20	Tops of case Museum...........	15-6-11	6,000,000	290,000	100
21	Museum basement case.........	"	8,500,000	510,000	66
22	Museum basement case..........	"	4,000,000	210,000	3,300
23	Museum basement pipe..........	"	12,000,000	190,000	3,300
24	Museum basement on stone block..	19-6-11	5,000,000	285,000	0
25	College class room on top of case...	"	2,000,000	2,000,000	100
26	College class room on top of case...	"	2,500,000	1,000,000	33
27	Settlement window sill..........	"	6,000,000	——	33
28	Settlement window sill..........	"	9,000,000	3,500,000	100
29	Settlement picture frame.........	"	18,000,000	5,000,000	100
30	Settlement picture frame.........	"	10,000,000	5,000,000	100
31	Settlement moulding............	"	15,000,000	3,000,000	100
36	School room shelf and window dust	27-6-11	500,000	150,000	33
37	Assembly hall shelf dust..........	"	1,700,000	700,000	33
38	Assembly hall, top of closet......	"	8,000,000	1,100,000	0
39	Assembly hall window sash	"	6,000,000	1,400,000	66
40	Class room shelf................	"	45,000,000	4,000,000	66
41	Class room picture frame.........	"	7,000,000	2,200,000	100
42	Class room moulding............	"	2,500,000	3,500,000	0
43	Class room 3rd floor.............	"	2,500,000	2,500,000	0
44	Class room window..............	"	450,000	——	0
45	Class room window..............	"	1,500,000	2,500,000	0

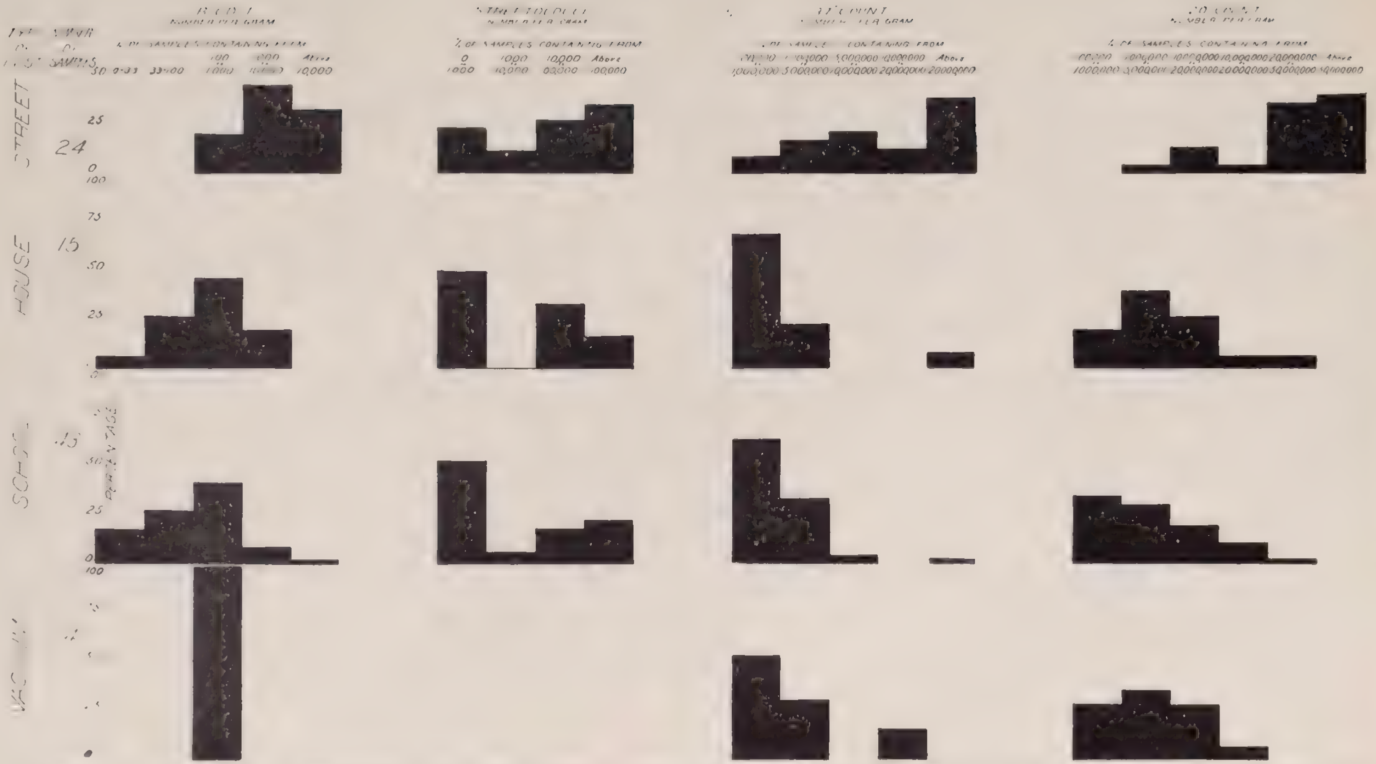

Diagram I. Distribution of samples of Dust from Streets, Houses, Schools, and Vacuum Cleaner, according to their content of bacteria at 20° and 37° and their content of colon bacilli and streptococci.

TABLE VIII—*Continued.*

Bacterial Content of School Dusts.

No. of sample.	Source.	Date.	Bacteria per gram.		
			Agar 20°.	Agar 37°.	B coli.
46	Class room window (different school)	30–6–11	1,000,000	500,000	66
47	Moulding, class room...........	“	2,000,000	1,000,000	100
48	Shelf, class room...............	“	700,000	600,000	100
49	Chandelier, class room..........	“	200,000	1,000,000	33
50	Top of closet...................	“	350,000	500,000	100
51	Moulding........................	“	200,000	150,000	100
52	Window..........................	“	300,000	100,000	0
53	Top of book case................	“	350,000	500,000	100
54	Picture frame class room........	“	250,000	350,000	100
55	Hall picture frame..............	“	5,500,000	950,000	6600
56	Book case, class room...........	5–7–11	400,000	250,000	100
57	Door cornice....................	“	3,500,000	250,000	66
58	Statuette, Assembly hall........	“	1,500,000	240,000	100
59	Hall picture frame..............	“	400,000	250,000	100
61	Class room picture frame........	“	2,000,000	500,000	66
12	College window outside..........	“	11,500,000	20,000,000	0
	Average.........................		4,790,000	1,730,000	1,850

3,730,000, for school dusts 4,790,000, and for street dusts 49,200,000. Of course the variation between individual samples of dust is naturally very great. There appears to be a tendency to seasonal variation, the samples collected in warm weather showing higher numbers, but our data are not sufficient to show this definitely.

These results harmonize well with those obtained by Miquel, Maximovitch, Mazza, Verdozzi, Uffelmann, and Mazuschita, cited above. The figures given by Maréchal and Manfredi are very much higher.

Total Counts by Liquid Culture Method. Bacteria from dry substances are apt to develop slowly on plates, and it occurred to us that some might not develop at all, which were still capable of multiplication in ordinary liquid media. We therefore made check determinations by the plate method and the dilution method with a special series of 21 samples with the results shown in Table XII and Diagram III. The first six samples were the same ones listed under corresponding numbers in earlier tables after storage in the laboratory for a period of about three to six months. Five of them, for which comparable data are available, show a drop in total count from an average of 9,000,000 to an average of 1,360,000, indicating a gradual decrease on standing. The other fifteen samples were fresh samples collected for this purpose and not included in Tables VIII–XI or Diagrams I and II. If they had been included they would have lowered the figures somewhat, for the nine indoor dusts had an

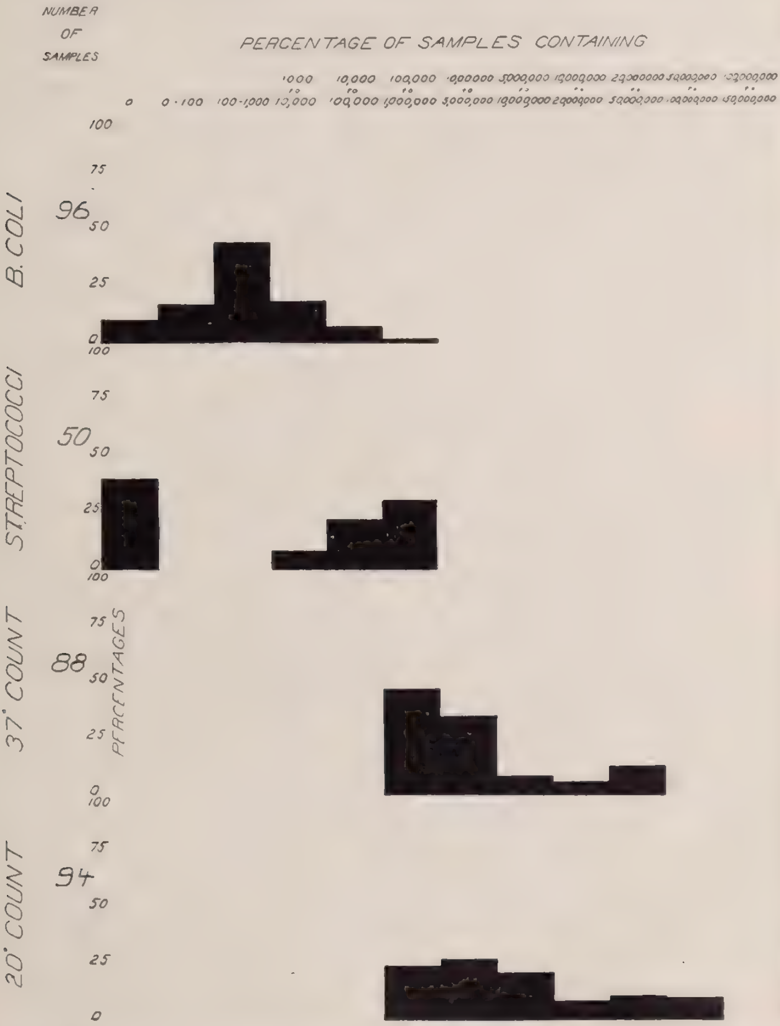

Diagram II.—Distribution of Dust Samples from all sources to show relative bacterial content at 20° and 37° and Relative number of colon bacilli and streptococci.

average of 760,000 bacteria per gram and the outdoor samples 4,700,000. These samples were collected in cold winter weather and, as noted above, winter dusts are perhaps lower in numbers than summer dusts. The general results of the comparison of the plate and dilution methods are best shown in Diagram III. The vertical lines show the contents of each sample by each method, the middle line for each sample indicating the liquid

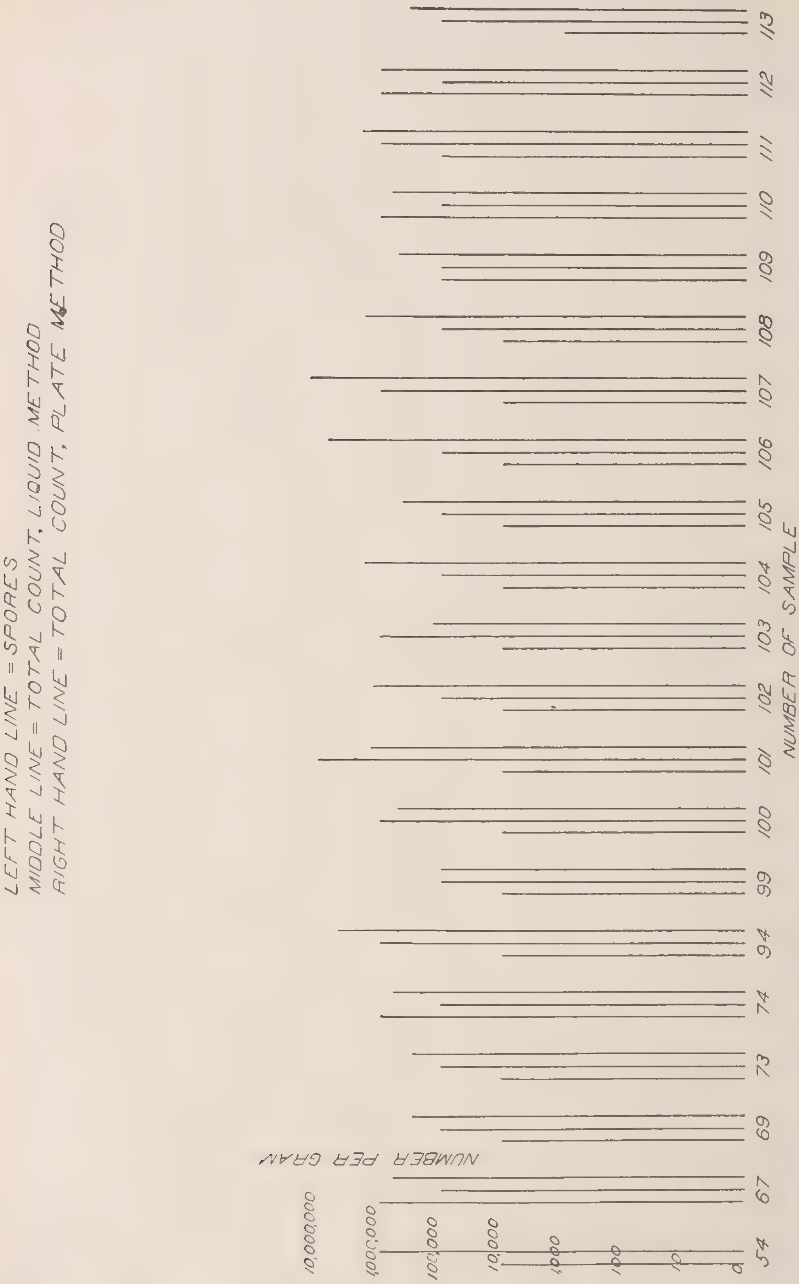

Diagram III.—Relative number of Spores and Total Bacteria, in Dust, determined by Plating and by a Liquid Culture method. Plotted on a Logarithmic Scale.

method and the right hand line the plate count. It must be noted that the scale is a logarithmic one so that the actual differences are much greater than appear to the eye. The relative relations are clear however. Out of 21 samples the plate count showed more bacteria than the liquid method in all but four instances. Sample 99 showed the same number and samples 100, 101 and 103 showed a higher count by the liquid method. The average of the 21 samples gave 1,920,000 by the plate method and 830,000 by the liquid method. This is about what should be expected if both the methods were accurate so far as experimental conditions go, for in the liquid method if growth occurs in the millionth dilution and not in the ten-millionth we call the number present one million whereas it is somewhere between one million and ten million. We may conclude at any rate that the plate count is reasonably accurate and gives a fair idea of the total number of bacteria capable of development on either solid or liquid media of the ordinary type and under ordinary conditions of incubation.

TABLE IX.

Bacterial Content of Vacuum Dusts.

No. of Sample.	Source.	Date.	Bacteria per gram.		
			Agar 20°.	Agar 37°.	B. coli.
66	Vacuum, Museum lecture hall . . .	9-8-11	550,000	690,000	100
67	Vacuum, Museum lecture hall	"	6,000,000	350,000	100
68	Vacuum, Museum lecture hall . . .	"	7,000,000	3,500,000	100
69	Vacuum, Museum lecture hall	"	2,000,000	240,000	100
70	Vacuum, Museum lecture hall	"	12,000,000	2,500,000	100
71	Vacuum, Museum Paleontology Dept.	9-16-11	1,500,000	10,000,000	100
72	Vacuum, Museum Paleontology Dept.	"	1,500,000	15,000,000	100
73	Vacuum, Museum Paleontology Dept.	"	9,000,000	1,000,000	100
74	Vacuum, Museum Paleontology Dept.	"	8,000.000	——	100
75	Vacuum, Museum Paleontology Dept.	"	600,000	700,000	100
85	Vacuum, Museum rug	10-13-11	280,000	220,000	100
86	Vacuum, Museum rug	"	2,000,000	2,000,000	100
87	Vacuum, Museum rug	"	1,500,000	430,000	100
88	Vacuum, Museum rug	"	250,000	240,000	100
	Average		3,730,000	2,850,000	100

TABLE X.

Bacterial Content of House Dusts.

No. of Sample.	Source.	Date.	Bacteria per gram.		
			Agar 20°.	Agar 37°.	B. coli.
1	Dining room floor	18–2–11	1,200,000	———	100
8	Bed room, window sill, inside	6–4–11	9,000,000	300,000	33
9	Book case shelves	"	1,100,000	780,000	100
10	Side board	"	6,200,000	490,000	3,300
11	Dining room shelf	"	11,000,000	1,000,000	6,600
13	Window sill outside, (back)	———	27,000,000	9,000,000	100
14	Front window sill outside	———	8,000,000	3,600,000	0
15	Window sill, inside	14–6–11	9,900,000	650,000	100
16	Shelf dust	"	1,500,000	540,000	3,300
32	Moulding	24–6–11	1,500,000	300,000	66
33	Moulding	"	1,000,000	470,000	100
34	Picture frame	"	700,000	300,000	33
35	Blown in through window on a polished surface	"	3,500,000	20,000,000	66
63	Moulding	5–7–11	380,000	270,000	100
64	Picture frame	"	490,000	———	100
	Average		5,550,000	2,900,000	940

Number of Aerobic Spores. The number of aerobic spores present was determined by the dilution method for the special series of 21 samples just discussed and the results are shown in Table XII and Diagram III. Comparison of the fourth and fifth column in Table XII and of the left-hand and middle lines in Diagram III show that spores capable of resisting heating to 175°–180° for ten minutes formed in most samples about one-tenth of the total bacterial flora. In seven of the 21 samples exactly this relation obtained while in nine cases there were less than one-tenth* and in five cases the spore count was the same as the count before heating or even higher. Of course the latter results are due to the experimental errors of distribution inherent in the dilution process. It may be concluded that one-tenth or less of the bacteria in city dust are spore formers and that the high total numbers found must be accounted for mainly by the persistence under dry conditions of vegetative cells. Manfredi found a still smaller proportion of spore formers.

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*The spore values for samples 99, 100, 102 and 103 are plotted in Diagram III as 10,000 but actually the $\frac{1}{10,000}$ dilution was negative and no lower dilutions were tested.

TABLE XI.

Bacterial Content of Street Dusts.

No. of Sample.	Source.	Date.	Bacteria per gram.		
			Agar 20°.	Agar 37°.	B. coli.
2	Subway Station, 135th St., near exit	18-2-11	7,000,000	———	6,000
4	Street, 145th St., and St. Nicholas Ave.	4-3-11	48,000,000	1,000,000	40,000
6	155th St., bridge across Harlem River	9-3-11	40,000,000	150,000	6,000
7	Gutter, front of main entrance to College	9-3-11	54,000,000	500,000	20,000
65	Street dust	8-9-11	———	45,000,000	330,000
76	Sidewalk dust	29-9-11	90,000,000	15,000,000	6,600
77	81st St., and Central Pk., cor. of Fifth Ave	"	83,000,000	40,000,000	100
78	81st St., and Cent. Pk., middle of block	"	100,000,000	28,000,000	10,000
79	Fifth Ave., and 83rd St.	"	30,000,000	4,500,000	100
80	Central Park Driveway at entrance near 5th Ave.	"	8,000,000	2,000,000	100
81	Brook Ave., near 169th St.	"	1,500,000	6,000,000	660,000
82	169th St.	"	15,000,000	3,200,000	3,300
83	Sidewalk Central Pk., W. and 81st St.	13-10-11	27,000,000	8,600,000	33,000
84	Sidewalk Cent. Pk. W., and 79th St.	"	22,000,000	6,500,000	66,000
89	Houston St.	4-11-11	54,000,000	40,000,000	6,600
90	Broadway and 79th St.	"	22,000,000	9,000,000	100
91	79th Street	"	7,000,000	8,000,000	10,000
92	Mixed Sample	"	52,000,000	36,000,000	3,300
93	Allen and Canal St.	10-11-11	22,000,000	16,000,000	6,600
94	Canal and Bowery	"	20,000,000	23,000,000	6,600
95	Grand and Essex Sts.	"	130,000,000	77,000,000	100
96	East Broadway, Seward Park	"	———	16,000,000	3,300
97	Chrystie and Grand Sts.	"	106,000,000	47,000,000	3,300
98	Essex and Grand Sts.	"	145,000,000	90,000,000	6,600
	Average		49,200,000	22,700,000	51,100

TABLE XII.

Comparative Numbers of Bacteria by Plate Method and Liquid Method, and Numbers of Spores, in Dust.

No. of Sample.	Source.	Date of Inoculation.	Bacteria per gram. 20°.			
			Liquid Method.		Plate Method.	37°.
			Total.	Spores.		
54	School dust.......	27–1–12	1,000,000	10,000	———	100,000
67	School dust	"	100,000	1,000,000	600,000	2,000,000
69	School dust	"	100,000	10,000	300,000	300,000
73	School dust	"	100,000	10,000	300,000	1,600,000
74	School dust.......	"	100,000	1,000,000	600,000	500,000
94	Street dust........	"	1,000,000	10,000	5,000,000	4,500,000
99	Window sash, library A. M. N. H.	1–2–12	100,000	10,000	100,000	100,000
100	House dust, shelf...	"	1,000,000	10,000	500,000	400,000
101	Heavy vacuum....	"	10,000,000	10,000	1,400,000	200,000
102	Light vacuum	"	100,000	10,000	1,300,000	300,000
103	House dust, top of gas meter........	"	1,000,000	10,000	130,000	200,000
104	Light dust, attic of A. M. N. H.	10–2–12	100,000	10,000	1,800,000	200,000
105	Light vacuum	"	100,000	10,000	450,000	200,000
106	Street dust........	"	100,000	10,000	6,900,000	1,700,000
107	Street dust........	"	1,000,000	10,000	14,500,000	1,200,000
108	Sidewalk dust	"	100,000	10,000	1,900,000	200,000
109	House window sill, bed room inside ..	17–2–12	100,000	100,000	500,000	200,000
110	Window sill, parlor inside........	"	100,000	1,000,000	650,000	150,000
111	Street dust, 78th St. and Columbus Ave.............	— ——	1,000,000	100,000	2,100,000	150,000
112	Sidewalk, 77th St...	———	100,000	1,000,000	1,000,000	150,000
113	Sidewalk dust, 77th St......	–	100,000	1,000	350,000	100,000
	Average ..		830,000	205,000	1,920,000	688,000

Number of Bacteria Developing at Body Temperature. The number of bacteria developing an lactose-agar plates at 37° varied from 100,000 per gram for sample No. 52 (window sill of a school) to 90,000,000 for sample No. 98 (street dust). The indoor dusts were usually between 100,000 and 5,000,000 and over one-half of them were under one million, while 90% of the street dusts showed more than one million and about 40% over 20 million. The average was between one and three million for the indoor dusts and about 23,000,000 for the street dusts. These figures are just about half as great as the counts obtained at 20° and this fact seems to us somewhat significant as a probable indication that the bacteria in city dust are largely of buccal and intestinal origin. MacNeal, Latzer and Kerr (1909) found the ratio of 37° and 20° counts for human feces to be about 90%. For Boston sewage it was found to be 73% (Winslow, 1905), while for unpolluted waters it is usually under 10% (Prescott and Winslow, 1908).

Number of Bacteria of the B. coli Group. The number of bacteria of the B. coli group was determined by the standard lactose-bile test incubating for 72 hours at 37° and calling all gas producers positive. Organisms of this type were usually present. All of the 24 street dusts showed positive results in $\frac{1}{100}$ gram or less, and about 80% had over 1000 colon bacilli per gram. Two samples showed 330,000 and 660,000 respectively. Of the indoor dusts, 9 out of 72 gave negative results in three duplicate $\frac{1}{100}$ gram samples. In most cases (39 out of 72) the numbers ranged between 100 and 1000 per gram and in 8 out of 72 samples there were over 1000 present. The maximum was 60,000. The average numbers for indoor dusts lie between 1000 and 2000 and for street dusts the average was 51,000.

It seems well established that the chief primary source of gas producing bacilli of this type is the alimentary canal of man and other warm-blooded animals and the considerable numbers of colon bacilli found are probally indicative of fecal pollution. It is obvious on microscopic examination that a good deal of street dust is ground up horse manure and this is presumably the chief origin of the colon bacilli found. It may be noted that the ratio of colon bacilli to total bacteria was 1 in 963 in the street dusts and only 1 in 3582 in the house dusts and this is what would be expected if the colon bacilli came from horse manure in the street and if the house dust is derived partly from the street and partly from internal sources.

Number of Acid-forming Streptococci. Aside from the horse droppings in the street, the principal source of pollution for city dust might naturally be looked for in the discharge of the sputum and mouth spray of human beings. The group of lactose fermenting streptococci may serve as a convenient index of pollution of this sort as we have pointed out above.

For the study of acid-forming streptococci in dust we used a special

TABLE XIII.

Streptococci in House Dust.

No. of Sample.	Source.	Date.	Acid-forming streptococci per gram of dust.
109	Window sill, bedrom inside	17–2–12	10,000
110	Window sill, parlor inside	“	<1,000
114	Window sill, bath room outside	21–2–12	<1,000
136	Carpet dust, dining room	1–3–12	10,000
143	General house dust collected by means of a vacuum	3–3–12	<1,000
146	House dust collected by a vacuum cleaner	“	100,000
	Average		20,000

TABLE XIV.

Streptococci in School Dust.

No. of Sample.	Source.	Date.	Acid-forming streptococci per gram of dust.
104	Attic A. M. N. H.	10–2–12	<1,000
105	Light vacuum A. M. N. H.	“	<1,000
115	Class room, floor dust	21–2–12	100,000
116	Toilet window sill in school	“	100,000
117	Class room window sill facing street	“	<1,000
118	Railing over clerk's office, school	“	100,000
119	Class room, top of closet	“	<1,000
120	Gas fixtures, school class room	“	1,000
121	Top of closet, class room	“	10,000
122	Window sash, class room facing court	“	<1,000
123	Class room floor	“	10,000
134	Picture frame, settlement room	1–3–12	<1,000
135	Window sash, College stairs	“	<1,000
137	Railing clothes closet, school room, 2 weeks old	“	<1,000
138	College hall, top of files	“	<1,000
139	Alcove dust, College	“	10,000
140	Tops of closet, settlement room	“	<1,000
141	Alcove dust, college	“	100,000
142	Window sash, college class room		<1,000
	Average		22,700

TABLE XV.

Streptococci in Street Dust.

No. of Sample.	Source.	Date.	Acid-forming streptococci per gram.
106	Street gutter	10–2–12	100,000
107	169th St,	“	100,000
108	169th St., sidewalk	“	100,000
111	78th St., and Columbus Ave., gutter	11–2–12	<1,000
112	77th St., sidewalk	“	<1,000
113	77th St., and Columbus Ave	“	<1,000
124	Brook Ave.	“	10,000
125	Brook Ave., and 169th St., gutter	“	10,000
126	8th Ave., and 135th St.	“	1,000
127	Lenox Ave., and 125th St.	“	10,000
128	7th Ave., and 131st St.	“	100,000
129	125th St. and 3rd Ave.	“	<1,000
130	134th St., and 7th Ave., cor	“	10,000
131	125th St., gutter	“	100,000
132	Third Ave., and 149th St., gutter	“	1,000
133	7th Ave., and 135th St.	“	10,000
144	East Broadway	3–3–12	100,000
145	Chrystie and Canal Sts	“	<1,000
147	Amsterdam Ave., and 78th St	“	<1,000
148	Allen and Canal Sts., gutter	“	100,000
149	Jefferson and East Broadway, gutter	“	10,000
150	77th St., near Columbus, gutter	“	100,000
151	Henry and Clinton Streets	“	100,000
152	Canal St., sidewalk	“	1,000
153	Canal St., and Eldridge	“	100,000
	Average		42,500

TABLE XVI.

Average Bacterial Content of Various Dusts.

Bacteria per gram.

Type of dust.	Lactose agar 20°.	Lactose agar 37°.	B. coli.	Streptococci.
Street	49,200,000	22,700,000	51,100	42,500
House	5,500,000	2,900,000	940	20,000
Vacuum	3,730,000	2,850,000	100	——
School	4,790,000	1,730,000	1,850	22,700

series of 50 samples collected during the winter of 1911–1912. Twenty-five were street dusts, six house dusts and nineteen school dusts. Several vacuum-cleaner samples are included in each of the latter groups as they were not enough to make a special class.

No tests were made in dilutions corresponding to amounts larger than $\frac{1}{1000}$ gram. Of the 25 indoor dusts (see Tables XIII and XIV and Diagram II) 14 gave negative results in the $\frac{1}{1000}$ dilution; one was positive in $\frac{1}{1000}$ gram, 5 in $\frac{1}{10.000}$ gram and 5 in $\frac{1}{100.000}$ gram. The average for all indoor samples (considering those negative in $\frac{1}{1000}$ dilutions as having no streptococci) was 22,040 per gram. Of the 25 street dusts (see Table XV), six were negative in the $\frac{1}{1000}$ dilution, three showed 1000 per gram, 6 showed 10,000 and 10 showed 100,000 or more. The average for the whole series was 42,500 per gram. The ratio of specific polluting organisms to total bacteria is particularly significant. While colon bacilli were relatively most abundant in the street dusts (1 in 963 against 1 in 3582 for indoor dusts), there was one acid-forming streptococcus out of 1157 bacteria in the street dusts and one out of 215 in the indoor dusts. This seems to indicate that, as might be expected, the colon bacilli come mainly from horse droppings in the street, while the streptococci come mainly from the human mouth.

V. SUMMARY AND CONCLUSIONS.

1. The total number of bacteria in city dust as determined by plating on lactose agar at 20° is high, ranging from 150,000 to 145,000,000 per gram. There is a marked difference between street dusts and those collected indoors. Street dusts were found to be usually over 20,000,000 and 24 samples averaged 49,200,000. The 72 indoor dusts were usually under 20,000,000 and averaged between 3 and 5 millions.

These results correspond closely with those obtained by Miquel (1881), Maximovitch (1894), Mazza (1897), and Verdozzi (1908) for house dust, and by Uffelmann and Mazuschita (1899) for street dust. Maréchal (1906) and Manfredi (1891) report much higher results and Ernst (1900) one very low one.

2. Spore forming aerobes usually make up only one-tenth or less of the total.

3. The number of bacteria developing at body temperature is about half that obtained by plating at 20°. The indoor dust showed usually between 100,000 and 5,000,000 with an average between one and three million. About half the street dusts showed over twenty million and all of them averaged 23 million.

4. All the street dusts and all but nine out of 72 indoor dusts showed colon bacilli, at least 33 per gram. In two street samples the numbers rose to 330,000 and 660,000 per gram, respectively, while the largest indoor

result was 60,000. The average for the indoor dusts was between 1,000 and 2,000 per gram and for the street dusts over 51,000. The ratio of colon bacilli to total bacteria was 1 in 963 for the street dusts and one in 3582 for the indoor dusts, indicating that as might be expected the origin of the colon bacilli is mainly the horse droppings in the street. The high results may help to explain the increase of colon bacilli sometimes noted in city reservoirs exposed to pollution from street dust.

5. Acid-forming streptococci, of the type characteristic of the human mouth and intestine, but not abundant in horse feces, were isolated from 11 out of 25 indoor samples and from 19 out of 25 street samples in dilutions corresponding to $\frac{1}{1000}$ gram. Five of the indoor samples and ten of the street samples showed over 100,000. The average for indoor dusts was 22,040 per gram and for street dusts 42,500 per gram. The ratio of acid-forming streptococci to total bacteria was 1 to 1157 for street dusts and 1 to 215 for indoor dusts, which is the general relation which might be expected if these organisms come mainly from the human mouth.

6. From the sanitary standpoint these results in regard to the streptococci are perhaps of some practical significance. The total numbers and the body temperature count, and even the detemination of colon bacilli have no bearing on the transmission of disease if, as seems probable, the latter are mainly derived from the feces of the horse. If, however, the acid-forming streptococci are really of buccal orgin, our data indicate a somewhat surprising quantitative pollution. If a gram of house dust contains 20,000 normal mouth bacteria of this one type, and a gram of street dust contains 40,000, it would seem that infectious organisms from the same source might be present in appreciable numbers, although it is of course not justifiable to assume that other organisms are necessarily as resistant to drying as the streptococci we have found.

7. The experiments of many observers, reviewed in the earlier portion of this paper, indicate that the tubercle bacillus and certain strains of streptococci and diplococci (some of them resembling the pneumococcus) are much more resistant than other pathogenic bacteria and may survive when dried in dust for several weeks. It must be remembered however that the reduction of bacteria under unfavorable conditions is a gradual process, rapid at first and slower afterwards, so that there is a marked diminution in numbers long before the organisms entirely disappear.

8. Actual isolations of non-spore-forming disease bacteria from dust have been confined almost wholly to a few findings of B. diphtheriae, and many findings of the tubercle bacillus and of streptococci and diplococci more or less closely resembling the pneumococcus. Isolations of the tubercle bacilli are by far the most significant. They indicate that this organism may sometimes be found in 5 10% of samples of dust not specially exposed to tubercular infection, while in the neighborhood of

phthisical patients 25–50% of the tests may prove positive. The experiments of Prausnitz (1891), Verdozzi (1908) and Le Noir and Camus (1909) suggest that B. tuberculosis may be present in numbers ranging from 5 to 20 per gram of dust.

9. It should not be understood that these results lend any weight to the theory of what is ordinarily conceived as the aerial transmission of disease. The dust examined by us and by others was lying inert on floors and other surfaces and could only be distributed in the air by more or less violent agitation. Such distribution does not ordinarily occur. The experience of the operating room has made it quite clear than even the ordinary septic organisms in quiet indoor air are almost negligible, and the experience of modern contagious disease hospitals tends strongly in the same direction. When dust is violently stirred up by dry sweeping or beating carpets indoors or still more by a March wind in a poorly cared for street we have however another set of conditions. Under such circumstances we take considerable quantities of dust into the nose and throat. If the dust contains 40,000 mouth streptococci, as our results indicate that it may, and if tubercle bacilli are present as often as other workers have found to be the case, inhaling and ingesting large quantities of dust may have a real sanitary significance.

10. While suggesting that dust inhaled or ingested in considerable quantities may be a real factor in the spread of certain diseases, we do not in any way dissent from the conclusion now generally accepted by sanitarians that in comparison with more or less direct contact and food infection it is quantitatively a minor one.

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THE SUCCESSFUL EFFORTS OF A SMALL CITY TO SECURE A MILK SUPPLY FROM TUBERCULIN TESTED COWS

C. H. Wells,
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The Board of Health of the town of Montclair, N. J., since its organization in 1894, has been noted for the vigilance with which it has supervised the production and the distribution of the milk supply. The dairies have been inspected, the cows have been examined by veterinarians, samples have been analyzed, poor supplies have been excluded from the town, dealers have been prosecuted for selling adulterated milk or milk from filthy sources, and all matters pertaining to the milk supply have been published.

In 1906 two or three cases of tuberculosis were detected by physical examination in each of two herds. It was believed that other cases of the disease might exist, and the milk dealers were notified that unless they consented to the application of the tuberculin test to these herds the milk would be excluded from the town. The tests showed over 50% of reactions. This was a revelation to the Board. During the previous eight years, at least, all herds which supplied Montclair with milk had been examined periodically by veterinarians and the diseased cows excluded. Moreover, the stabling conditions were so superior to the average dairy that it was not believed that the disease could make such headway. It was apparently the duty of the Board of Health, in view of its own experience, to require the tuberculin test of all cows from which milk was obtained for sale in Montclair, and the following ordinance was adopted in April, 1907:

> Article 8, Section 5. Cows and Feed. (a) No milk shall be sold or offered for sale or distributed in the Town of Montclair except from cows in good health nor unless the cows from which it is obtained have, within one year, been examined by a veterinarian whose competency is vouched for by the State Veterinary Association of the State in which the herd is located, and a certificate signed by such veterinarian has been filed with the Board of Health stating the number of cows in each herd that are free from disease. The examination *shall include the tuberculin test* and charts showing the reaction of each individual cow shall be filed with this Board. All cows which react shall be removed from the premises at once if the sale of milk is to continue, and no cows shall be added to a herd until certificates of satisfactory tuberculin tests of said cows have been filed with this Board.
>
> Section 8. Cream. No cream shall be sold, exposed for sale or delivered within the Town of Montclair unless it be produced and handled in accordance with the requirements hereinbefore set forth for the production and handling of milk.

By an amendment passed in April, 1908, pasteurization under conditions prescribed by the Board of Health was allowed as a substitute for the tuberculin test.

With the present-day knowledge of the relation between bovine and human tuberculosis any board of health that does not require the tuberculin test, or pasteurization of the milk as an alternative, must be considered negligent. Legal decisions upholding the legality of the requirement are now numerous. It should be borne in mind, however, that at the time of the adoption of the Montclair ordinance in 1907 the reports of the English and German Commissions on Tuberculosis had not been published, nor had Dr. Wm. H. Park and other investigators made their series of experiments that have proven conclusively that a large percentage of certain types of tuberculosis in the human being is of bovine origin.

Within a short time after the ordinance went into effect all of the dealers, with two exceptions, complied with its requirements. One of these dealers withdrew from the business rather than apply the test and the other dealer, a large company, was granted an extension of time in which to bring about the application of the test to the large number of herds from which its Montclair supply was obtained. It is interesting to note that of the New Jersey cows that had not been tested previously, 25% reacted. Many of the figures that are available on the subject of the prevalence of tuberculosis among dairy cows relate to suspected or picked herds, whereas the percentage of reactions above mentioned represents conditions of herds taken practically at random over a considerable area, with the exceptions that they had more than the average veterinary inspection, and that they have been stabled under good conditions.

In order to avoid any possibility of a milk shortage in the winter season, to give every opportunity to the company above referred to for improving its supply, and to give full notice to householders, the Board subsequently voted to permit the company to sell milk until May 15, 1908, even if the larger part of the supply was from untested cows, and under date of November 1, 1907, the Board distributed a circular to every house in the town, stating the time and cause of the postponement and recommending that until all the milk delivered in the town was from tuberculin-tested cows, families which included children under three years of age should take milk from some one of the dealers who had complied with the tuberculin test ordinance. The Board also recommended that such families as continued to take the milk from untested cows should either boil or pasteurize it.

Notwithstanding the publicity that had been given the entire matter through the press and by means of circulars, two of which were distributed during the controversy in addition to the annual report, in which the matter was set forth fully, only a comparatively small number of customers changed over to a milk supply that was recommended by the Board of

Health, and the majority of these that did change over went back to the dealer, whose product was not recommended by the Board, just as soon as the agitation was over. This fact is another proof that, regardless of how food products are labelled, the cheapest article is the one that will be purchased by a certain class and that boards of health must see that the cheapest article is safe for consumption.

A few days before the expiration of the time limit above mentioned the company obtained a writ of certiorari which prevented the Board of Health from enforcing the tuberculin-test requirement until the right to pass such an ordinance had been established by the State Supreme Court. After many delays, the first testimony in the case was taken in November, 1908. The usual legal postponements followed so that it was not until April 17, 1911, four years after the ordinance was adopted, that the case was argued before the State Supreme Court.

Notwithstanding that the ordinance was inoperative by virtue of the writ of certiorari, the company, in 1908, commenced an action in the Circuit Court of the United States to enjoin the Board of Health from enforcing the same ordinance. The Board of Health endeavored to have this suit dismissed upon the ground that an injunction was wholly unnecessary, as the company had already obtained a temporary stay that would fully protect it until the final decision in the other action. The Board was unsuccessful in its efforts to have the suit dismissed, but the case was not pushed and no testimony was taken.

The decision in the State Supreme Court case was handed down on June 6, 1911. Every point at issue was decided in favor of the Board. The company promptly filed an appeal in the Court of Errors and Appeals and the appeal was about to be argued in November, 1911, when the company signified its intention of complying with the ordinance and withdrew both the appeal and the action that had been begun in the Federal Court. The legal status of the tuberculin-test requirement therefore reverted back to the Supreme Court decision and the ordinance became effective.

Only three milk dealers in addition to the one that had taken the matter to the courts, took advantage of the restraining order and refused to have their herds tested. As soon as the ordinance was reinstated, however, they promptly complied with its provisions. The company that had carried on the litigation arranged for a dual milk supply. One portion of the supply is from tuberculin-tested cows and the remainder is pasteurized. Emphasis should be laid upon the fact that the milk that is pasteurized must be produced and handled in accordance with the regulations laid down for the milk from tested cows. The pasteurization is merely a substitute for the tuberculin test and is only allowed upon resolution of the Board of Health and under conditions prescribed by the Board. The

Board has a perfect legal right to withdraw at any time its resolution allowing the sale of pasteurized milk.

A most natural question arises as to what effect the enforcement of the tuberculin-test requirement has had upon the price of milk. The number of dealers who sold milk from tested cows previous to the enactment of the ordinance was too small for the range of price of these supplies to serve as a guide to the normal range of price during the period under consideration. It is a fact, however, that the price of all the supplies that were from untested cows at the time of the adoption of the ordinance advanced one cent when the ordinance was enforced, with the exception of the price of the supply that is pasteurized, which remained unchanged. Many factors enter into the cost of milk and it must not be assumed that the increase of one cent per quart is wholly due to the expenses attached to the test. It has been proven that farmers will make money by applying the test if they can receive one-half cent per quart increase in price.

The witnesses in the case included such eminent men as Drs. J. G. Adami, John F. Anderson, Lawrence F. Flick, Harry D. Gill, Alfred F. Hess, James Law, John R. Mohler, Wm. H. Park, Ernest C. Schroeder and Theobald Smith. The testimony made a volume of over 900 pages.

The following extracts from the New Jersey Supreme Court decision in the case are of sufficient importance to be given here in the hope that they may be of value either in strengthening the convictions of some health board that already has the matter under consideration or in spurring some health official to renewed activity along the lines suggested:

1. "Boards of Health are empowered by the Act of 1897 (P. L. 270), and by the Pure Food Law of 1907 (P. L. 485), taken in conjunction with the Act of 1887 (P. L. 80) to prohibit the sale of milk from diseased cows.

2. "Whether cows from which a municipality is supplied with milk are diseased, is a question that may, in the first instance be determined by the local board of health.

3. "In determining whether cows from which a municipality is supplied with milk are diseased, the method of diagnosis adopted by the local board of health should be one that is well recognized, thoroughly approved, and as reliable as any.

4. "A local board of health may prohibit the sale within the municipality of milk from cows which react to the 'tuberculin test.'

5. "The action of a local board in adopting measures for the protection of the public health will not be set aside by the court if the board has acted reasonably upon evidence that might satisfy a reasonable man.

6. "Regulations for the protection of the public health are within the police power of the state and are not an illegal interference with interstate commerce if they have a real substantial relation to the public object which government can accomplish, and are not arbitrary and unreasonable and beyond the necessities of the case.

7. "We find that the tuberculin test is the most reliable method of diagnosis of tuberculosis in cattle now known; that while it is not perfect the percentage of error is as small as in any method suggested, and that it is more accurate than the method by physical examination. We rest this conclusion not merely upon the testimony in the case but upon the fact that it has been approved by judicial decision in Minnesota, Louisiana, Wisconsin and Penn-

sylvania, and adopted by the most recent statute in Delaware, Indiana, Maryland, Michigan, Minnesota, New Mexico, North Dakota, Oregon, Pennsylvania, South Carolina, Tennessee, Washington and Wisconsin, and for some purposes by Maine, Massachusetts and Vermont. The 'tuberculin test' referred to in the act of South Dakota is probably the same. A similar act was passed by our own legislature in 1899 (P. L. 484). These statutes are legislative testimony of cumulative force to the value of the tuberculin test as a diagnostic agent. We think, therefore, that the board of health is justified in the position that cattle which react to the tuberculin test are diseased. That conclusion may occasionally be erroneous, but is as nearly accurate as is possible. The statute empowers the board of health to prohibit the sale of milk from such cattle.

8. "It seems to be established that there is very little chance of communication of bovine tuberculosis to human beings above the age of sixteen years, but that there is a very serious danger of communication through the medium of milk to human beings under sixteen years of age and especially to children under five years of age. It is conceded that there are such cases. The concession that bovine tuberculosis may be communicated to young children and that although it appears in them in the less common forms rather than in the form of pulmonary tuberculosis, suffices to justify action to guard the young against the contagion. It is for the board of health to decide how many lives must be endangered, and whether the lives of a few infants or children are worth the effort and financial loss.

9. "The evidence justified a finding that the subjection of the cows from which a supply of milk is derived to the tuberculin test is a reasonable method of determining not only whether they are diseased, but also whether their milk may carry the germs of tuberculosis.

10. "Surely, milk from cattle that react to a tuberculin test has been exposed to disease, and if the cattle themselves may be kept out of the state, it is fairly within the discretion confided with boards of health to exclude also milk, the produce of the cattle, which it is proved may at times convey the disease.

11. "We think the ordinance in question is valid, and that the writ of certiorari should be dismissed with costs."

THE USE OF FISH AS A SANITARY MEASURE TO ELIMINATE MOSQUITOES

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During my administration as local sanitary officer in charge in the Province of Camaguey, in the island of Cuba, during the recent intervention by the United States Government on that Island, the question of the elimination of certain species of mosquitoes, presented itself to the sanitary officers in charge, as one of paramount importance. Previous to this intervention, the occurrence of appreciable numbers of cases of Yellow Fever on the Island, had already attracted the attention of the United States, in as much as these cases were increasing in number at different points in Cuba. Sanitary conditions, as left by the U. S. Government at the close of the military occupancy succeeding the Spanish-American war, had been digressed from and protection against Yellow Fever was required not only of the non-immune residents of the Island, but also of the armed forces of the United States which were ordered on duty at this point.

The problem was a difficult one. A small idea of the vast extent to which sanitary measures were required, may be formed when I say that the larger number of Cuban towns are supplied with water for public consumption, from cisterns, commonly known there as "aljibes," large earthern jars "tinajones," holding from 100 to 500 gallons, rain barrels, and other receptacles for catching and storing rain water.

Stegomyia fasciata, or Stegomyia calopus, the mosquito which transmits Yellow Fever, is essentially, as is commonly known, a house inhabiting mosquito, preferring rain water for its propagation. It lays its eggs in anything that holds water around a house, such as in cisterns, water jars, barrels and other deposits. I have noted enormous numbers of larvae of this species, in tin cans, broken bottles, in trash heaps where water was lodged, and even in small crevices in low roofs and on the tops of brick walls, as well as in drinking troughs and receptacles for cattle and chickens. Not only does the Stegomyia fasciata deposit its eggs in the receptacles already mentioned, but also when no water is found, on the inside of rain pipes and on the mossy, damp sides of wells and other damp and protected spots. By the word "protected" in this instance, I mean protected from the rays of the sun, which in the tropics, would quickly kill dry eggs exposed to it. The heavy dews at night, always noted in these latitudes, is sufficient to moisten the egg, and preserve life until a shower falls. Larvae appeared in certain instances in the water of cisterns completely under

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ground and covered mosquito-proof, (with the exception of the pipe from the roof rain leaders) within a few hours after a shower, and greatly puzzled me by their presence. Observation of a few days, however, showed that eggs were deposited previously to a rainfall in such positions that the rain washed them into the cisterns, where, by their natural buoyancy they floated on the surface as if deposited in the natural way by the female mosquito and hatched out in the customary manner. The great problem was how to exterminate the Stegomyia in these towns. In the particular town that I have reference to, there existed upwards of 25,000 different permanent water deposits and as many more temporary ones. The first measure resorted to for the extermination of the mosquito in this particular place, was the thorough cleaning of the town in a sanitary way. Gangs of men with rakes, shovels, and picks were detailed to cover the town by consecutive streets, and to enter the houses, and one by one, clean up the yards and remove the debris from the same, by wagons furnished for that purpose. All cans, broken bottles, etc., were completely eliminated, and the tenants or owners of the houses whose yards had been cleaned, were warned that should further collections of such a character be allowed to accumulate, a fine would be imposed upon them forthwith.

The great question of how to treat the deposits of water used for drinking purposes, was still unsolved. The use of crude petroleum was now resorted to. This immediately created such a furor and public protest, that the measure had to be abandoned; the public postively refusing to drink petrolized water.

The next measure taken was the covering of rain barrels, jars, etc., with tin covers, the cisterns being covered with mosquito proof-netting. But in effectiveness the measure was a failure; the public being unused to the installation of sanitary measures and the observation of sanitary law. A sanitary inspector often would find the good wife of the house going to the grocery store with the tin top of the water deposits, which made a most convenient and admirable receptacle to bring charcoal and vegetables to the house in, or, in other instances, the good man of the house was found feeding grain to his horse in the back yard in the top that should have been keeping Stegomyia out of his rain barrels.

The next measure tried was the application of spigots to the jars and barrels, and nailing the tops on the cisterns, and the application of pumps to the same, but without positive results. Carelessness on the part of the public still existed and the measure had to be abandoned. The Stegomyia propagated on in their merry way.

In looking over the situation and in the course of inspections, it occurred to me that in many instances I had noted that in wells and cisterns where by chance, or otherwise, there had been introduced small fish by the children of the house, or others, that no larvae were present. I looked into this matter further and found confirmation of my surmise that the fish destroyed the larvae. On studying the fish, the class which I observed gave best results were what are known as "Guajacones" a kind of small fresh water minnow, indigenous to Cuba, of which there are three genera and five species. They commonly inhabit the lagoons, streams and ditches of the Island, and seem to have a somewhat purifying effect upon the water they inhabit, assimilating to a certain degree, organic substances. They devour voraciously the larvae of the mosquito wherever found, and will destroy eggs as well, before they have hatched into the second stage of the development of the mosquito. These species of "Guajacones" are viviparous; the young fish recently born move about swiftly and grow very rapidly. The male attains a size one-third less than that of the female when full grown.

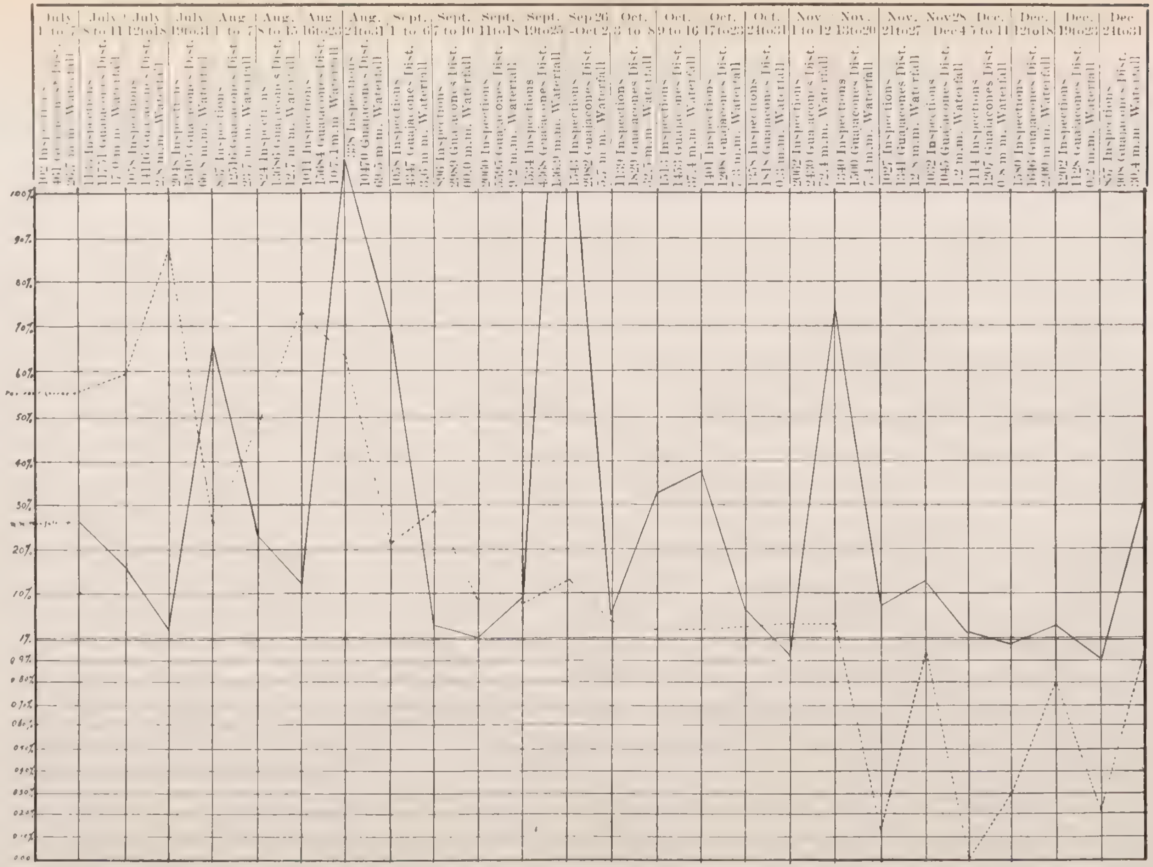
The female commonly destroys her own young by devouring them, so that the young fish must be kept by themselves as much as possible. The female gives birth about every thirty days, especially during the summer months. The first birth constitutes from ten to twenty little fish, according to her environment being favorable or not. The second birth usually approximates fifty. This occurs without any fecundation having taken place, repeated births occurring from time to time. Whether the females were born fecundated, I was unable to determine. The male fish can be easily distinguished from the female, as the latter have the anal fin much shorter, and the male has the anterior portion prolonged. The dorsal fin is distinctly constituted according to the genus; some presenting capsules, hooks, spines, fans, etc., marvels of construction not seen in any other genus of fish. (Poey).

The easiest genus to raise, on account of its being carniverous, is the "Gambusia Punctata," this is the hardiest species and is the most voracious in the destruction of the mosquito. The most beautiful is the "Guardinus Metallicus," which is a silver white. These fish live in schools, not only with those of the same species, but those of other species as well. In the town of Camaguey where I carried on these experiments, the following species were most common:

Gambusia Punctata
Gambusia Puncticulata
Guardinus Metallicus.

On the eighth day of July, 1908, after concluding that the only measure which would give positive results, would be the destruction of the larvae of the mosquito by the use of fish, I began to put in force the distribution of the above classes of fish throughout the town indicated. The first days were accompanied by difficulties, in as much as the collection of the fish from the rivers by men employed for that purpose by means of small nets, was accompanied by an excessive mortality amongst the fish. This

CHART SHOWING THE RESULT OF THE USE OF FISH FOR THE ELIMINATION OF THE MOSQUITO, EXPERIMENTS CARRIED ON AT CAMAGUEY, CUBA, FROM JULY 1, TO DECEMBER 31, 1908.



The dotted curve indicates per cent. of water deposits in which larvæ was found in the number of inspections indicated at the top of the column. Absolute elimination of all larvæ was found to have been accomplished in the 1032 inspections between November 28th and December 4th.

The solid rainfall" indicates the total rainfall during the week ending as indicated at top of column. Note the corresponding rise in "Larvæ %" curve the second week following heavy rainfall.

m.m. = millimeters.

* The name of the class of fish used in this experiment.

mortality reached such an alarming point, that the feasibility of putting this measure into effect became questionable. I then determined to buy fish from small boys at 20¢ per 100, delivered to the Sanitary Department corral, in good condition and alive. This gave positive results as regards numbers, but the percentage of mortality still remained the same. I noted, however, that the fish caught late in the day died in large numbers, while those caught early in the morning usually lived. I, therefore, ordered the fish caught at daybreak, before the heat of the tropical sun manifested itself, and had them transferred to their destination before 6 a.m.

The work of distributing necessitated the use of comparatively small receptacles. In these deposits heavy mortality occurred due evidently to the change of water, and the rapid exhaustion of the oxygen from the same. The fish presented a condition of lethargy upon being introduced into these deposits containing rain water instead of river water, so I determined to employ a gradual attenuation method, changing the water gradually from river water into rain water before the final distribution of the fish took place, with the result that the mortality was greatly reduced, and the method of distributing the fish became feasible. The attenuation of the fish lasted practically from about four to seven days. Tanks for the reception or storing of the fish were prepared, and each inspector was provided with a bucket, preferably of wood, with a movable cover, and carrying approximately 200 fish. The fish are not transferred from the buckets to the final deposits by hand, (the hand should not touch the fish in this transference), but are caught in a ladle and finally introduced into the earthen jars or barrels to be treated. They should not be thrown into the water, but the ladle submerged below the surface and the fish allowed to swim away. The distribution took place before ten in the morning, and after four o'clock in the afternoon.

My observation as regards the destruction of mosquito larvae in deposits where these fish had been introduced, was that fish from one month old on, destroy the larvae when found by them, without regard as to the class of larvae. They will destroy the larvae of the "Culex Pipiens" or the "Anopheles," as well as that of the "Stegomyia."

I provided a 500 gallon deposit with six fish, and allowing the deposit to remain uncovered and open to the air, giving free access for mosquito propagation in it. The jar contained numerous larvae upon the introduction of the fish; but I could demonstrate no larvae after four days, and no further propagation occurred while the fish were present; the water in the jar remaining clear and palatable, and free from algae, as well as larvae. These fish will live on algae and infusoria when larvae are not present.

The accompanying chart will indicate exactly the reduction of mosquito propagation, as well as the total rainfall occurring from July 1, 1908 to Dec. 31, 1908 and the total number of fish employed to obtain these results:—

Received for publication, April 28, 1912.

American Journal of Public Health

Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. SEPTEMBER, 1912. Number 9

$2.00 a year. 20 cents a copy.
LIVINGSTON FARRAND, M. D., Editor. SELSKAR M. GUNN, B. S., Managing Editor.
PHILIP P. JACOBS, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

THE PLAGUE SITUATION

If demonstration were wanting of the efficiency of modern sanitary methods no better example could be found than in the way in which plague has been controlled in Porto Rico and Cuba and its advancement upon American soil stayed.

From the beginning of the epidemic on June 17, 1912, to August 20, 1912, there occurred on the island of Porto Rico 49 cases of bubonic plague of which 23 died.

The Surgeon General of the U. S. Public Health Service was notified at the beginning of the epidemic, and it becoming apparent that the number of officers in Porto Rico was insufficient to cope with the situation Passed Asst. Surg. R. H. Creel, an officer having considerable training and experience in the eradication of bubonic plague, was ordered to San Juan on June 20. Pending his arrival P. A. Surg. S. B. Grubbs, U. S. P. H. S. the Chief Quarantine Officer of Porto Rico took charge of the situation in co-operation with the local authorities. From time to time other officers have been ordered to the assistance of Dr. Creel and the expenditure of $7000 per month from Federal funds has been allowed for the work of eradicating plague in Porto Rico. A laboratory for the examination of captured rodents was installed under the charge of P. A. Surg. C. W. Chapin, and several thousand rats are already being examined weekly from all parts of the island.

Upon the declaration of plague in San Juan, the usual panic supervened. A large number of persons left the city, and a spasm of cleanliness which resulted in the dumping of much garbage into the street followed. Eye witnesses state that the city underwent a cleansing such as it had not received in many years. The greater number of cases occurred in Puerte de Tierra.

To date 3 cases with 2 deaths have been reported from Havana, Cuba.

No infected rats have been found and apparently the infection was limited in its extent and was apprehended very early. However, the collection, examination and extermination of rodents is being continued in that port.

Another plague focus has been discovered in the United States by the finding of a plague rat in New Orleans, La., on July 27, 1912. Plague preventive measures had already been begun by Dr. Oscar Dowling, the state health officer and by Dr. W. T. O'Reilly, the city health officer, in conjunction with Surgeon J. H. White, U. S. Public Health Service. This work has been expanded and continued, and Passed Assistant Surgeon E. Francis and Passed Assistant Surgeon R. A. Herring, have been dispatched to Dr. White's assistance. No other plague infected animals have been found although several hundred rats have been examined.

Plague preventive measures have also been instituted in several of the other cities on the advice of Surgeon General Blue—Key West, Pensacola, Mobile, Norfolk, Philadelphia and New York, have all started to catch and examine rats.

Sanitary science and efficient application have served to ward off a scourge and to protect our public health and commercial interests. There has been a spirit of good team work on the part of the municipal, city and federal health authorities. Future campaigns will be won by a continuation of this efficiency and team work.

THOMAS BAILEY McCLINTIC

The recent death of Dr. Thomas Bailey McClintic, of the United States Public Health Service, from Rocky Mountain spotted fever which he contracted while supervising the work of eradication of this disease in Montana, adds one more name to the list of those who have given up their lives for the cause of humanity.

At the request of the Montana State Board of Health, Dr. McClintic had been making researches into this disease and was superintending the measures for its eradication especially in the Bitter Root Valley. His work had been crowned with such success that no cases had taken place in that section of the country during this season. While pursuing laboratory investigations with infected ticks, Dr. McClintic was bitten and developed the disease, which ran a rapid and fatal course. By the death of Dr. McClintic, the Public Health Service has met with the loss of an officer whose work held every promise for a brilliant and useful future, and a large circle of his friends will miss the presence of a singularly lovable character. Dr. McClintic will not, however, have died in vain as his death will emphasize, as would be possible in no other way, the necessity for the eradication of this disease, and his work will indicate means by which this can be successfully accomplished.

REVIEW OF LEGISLATION PROPOSED TO AND ENACTED BY THE GENERAL COURT OF 1912

Mark W. Richardson, M. D.
Secretary of the Massachusetts State Board of Health

Read before the Massachusetts Association of Boards of Health, July 25, 1912.

The amount of legislation proposed to and enacted by the general court each year is enormous and grows in volume with each succeeding year. In this increased legislation public health questions have played no small part and any detailed treatment of health legislation for the year 1912 would consume much more time than is available this afternoon. I shall be compelled, therefore, to restrict myself to the merest outline in my treatment of the subject, in the expectation that the points of greatest interest to the association will be brought out in the discussion.

No year would be complete at the State House without a discussion of the vaccination question and 1912 has been no exception in this respect. There were the usual bills to abolish vaccination entirely and to admit children to the public schools without restriction. These were to be expected from experience in previous years. A new bill, however, devised by the anti-vaccinationists, and one quite clever in its conception, was House Bill No. 34 entitled "an act to provide for protecting the purity of vaccine virus." This bill provided, amongst other things, that the distribution, sale or offering for sale or having in possession with intent to distribute or sell, vaccine virus which contains staphylococci, streptococci, bacilli of tuberculosis, etc., be forbidden. Inasmuch, however, as it is impossible to produce vaccine virus which does not contain staphylococci of a non-virulent type, and inasmuch as a vaccine virus which is sterile is also worthless, it is easy to see what the effect would have been had this bill become law. As a matter of fact, all the vaccine bills were given leave to withdraw.

A subject of cognate interest is that of specific inoculation against typhoid fever and, as regards this procedure, the legislature by the enactment into law of a bill introduced by the State Board of Health gave that Board the power to produce and distribute not only antitoxin and smallpox vaccine, but also "specific material for protective inoculation against typhoid fever and such other diseases as said Board may, from time to time, deem it advisable to produce and distribute."

As regards the antityphoid vaccine, measures are now being undertaken for its production by the Board and it will be available to physicians and boards of health probably within the next month or six weeks.

House Bill No. 32 provided for a board of registration of masseurs and the defining of its powers and duties. This bill was given leave to withdraw, although there can be little doubt that the profession of massage is one which should be regulated much more closely than it is at the present time. The legislation of 1911, required that masseurs should be licensed by local boards of health and this necessity for licenses should have brought about a considerable improvement in conditions affecting this profession. The legislature of this year amended the law of last year so as to allow a person licensed to practice massage in one town to exercise the profession in another town without further license.

House Bill No. 323, placing the supervision of all buildings or parts of buildings which are occupied as biscuit, bread or cake bakeries or for the manufacture of flour or meal food products under the State Board of Health, was recommended favorably by the Committee on Public Health, but was rejected in its third stage by the House. As a further evidence of the tendency to regulate occupations of various types, House Bill No. 490, providing for legislation requiring the licensing of cooks and bakers was presented. This bill, however, did not get beyond the committee stage, in spite of the fact that conditions under which cooking and baking are done are without doubt susceptible of grave criticism.

The conditions under which our people live is a subject of the greatest importance and House Bill No. 541 providing for the appointment of a commission to investigate housing conditions within the Commonwealth would seem to have had good reason for existence. The matter was. however, referred by the Committee on Public Health to the next Genera Court.

Chapter 635, however, an act relative to tenement houses in towns would seem to be of great importance. It goes into great detail as to the condition under which tenement houses may be built and maintained, and provides, amongst other things, that no tenement house hereafter erected shall occupy, either alone or with other buildings, more than 65% of a corner lot nor more than 50% of any other lot; that each tenement shall have 25 feet of frontage on the street and that the total window area in each room, including water closet compartments and bathrooms, shall be at least one-seventh of the superficial area of the room, and the top of at least one window shall be not more than eight inches below the ceiling, and the upper half of it shall be made so as to open the full width; there shall be also at least one room containing not less than 150 square feet of floor area.

Each apartment must have a separate water closet located in a bathroom or separate compartment. No water closet shall be placed in the cellar, and there shall be no living rooms in the cellar.

Furthermore, the State Board of Health shall have power to examine into the enforcement of the laws relating to tenement houses in any town, and whenever required by the governor shall make an examination and shall report the result thereof to the governor within the time prescribed by him therefor.

House Bill No. 1047 finally enacted as Resolve No. 117 provides that the State Board of Health shall instruct and assist local boards of health as to the best method of extermination of mosquitoes and for this purpose an appropriation of $1,000 was voted.

In order to carry out this act the Board proposes to distribute free of charge to local boards of health and to any other citizens interested, Bulletin No. 88 of the Bureau of Entomology of the United States Department of Agriculture, concerning mosquito prevention. This pamphlet gives a quite complete discussion of the subject and will be available for distribution within the next few weeks.

Incidentally, I may add that practical demonstrations of the efficiency of marsh drainage are now available, in case any person desires to investigate, at Ipswich and also in the town of Revere.

Chapter 334 provides that in every city, except Boston, and every town which accepts the provisions of this section or has accepted the corresponding provisions of earlier laws may, for the prevention of fire and the preservation of life, health and morals, by ordinances or by-laws not inconsistent with law and applicable throughout the whole or any defined part of its territory, regulate the inspection, materials, construction, alteration, height, area, location and use of buildings and other structures within its limits, except such as are owned or occupied by the United States or by the Commonwealth and except bridges, quays and wharves, and may prescribe penalties not exceeding one hundred dollars for each violation of such ordinance or by-laws.

A bill affecting quite extensively certain activities of the State Board of Health was House Bill No. 385, establishing a department of labor. This bill was finally enacted as Chapter 726, Acts of 1912, and takes away in practically its entirety that portion of the work of the State Board of Health relating to factory inspection and occupational hygiene. To be sure the Board still has the power of investigation concerning occupational diseases in their relation to the public health, but executive functions are practically removed from the sphere of the Board's influence and deposited with a sub-division of this bureau of labor.

Entirely apart from the progressive character of the work done by the Board in this department, it would seem to be distinctly questionable whether it will be found desirable to have removed this health work from the State Board of Health, especially as it involves the formation of a new health body and will, in that way, complicate the health administration in the Commonwealth. This act does not go into effect, to be sure, until June 1, 1913, and perhaps the legislature of 1913 will modify the provisions of the act. As it stands, at present, however, the State Board of Health will have no active part in the enforcement of health laws in factories and mercantile establishments after the 1st of June, 1913.

Chapter 470 of the Acts of 1912 empowers the Secretary of State to place upon the birth return blanks a synopsis of Chapter 251 of the Acts of 1905. The Secretary of the Commonwealth has accordingly placed the following words at the top of the birth return blank in red ink:

> Redness, swelling and unnatural discharge from one or both of the infant's eyes within two weeks after birth must be reported immediately to the Board of Health.

Chapter 280 requires a statement in the birth return as to "whether or not the physician or midwife signing the birth return personally has attended the birth." The Secretary of the Commonwealth has accordingly placed at the bottom of the state birth return blank the following words in red ink:

> State on this line whether you personally attended the birth:
> Yes or No......................................

Section 17, Chapter 29 of the Revised Laws states that,

> City and town clerks shall distribute the blank forms as the Secretary shall direct. A city or town may provide such books and forms, if they conform to those prepared by the Secretary.

Local boards of health can help to lay a firm foundation in their infant hygiene work by making it clear to city and town clerks that their birth return blanks should be similar to those distributed by the Secretary of the Commonwealth.

The law concerning the reporting of ophthalmia neonatorum will then be under the eyes of the doctor every time he signs a birth return. Information will also be available as to what physicians are signing birth returns for midwives.

Chapter 280 of the Acts of 1912 requires that the full report of the birth must be made within two weeks, and that, if this full return is not made within 48 hours, at least, a brief notice of the birth must be mailed or delivered to the clerk or registrar of the city or town in which the birth occurred within 48 hours, stating the date and place of birth, giving the street number, if any, the number of the ward (in a city) and the family name.

Chapter 280 also requires that the city or town clerk or registrar shall file daily with the local board of health a list of all births reported to him. This notice should be insisted upon by local authorities. If received regularly within 48 hours, local boards of health will be in a position to inaugurate any necessary plans concerning infant hygiene.

Chapter 59, Acts of 1912, to restrict the use of common towels reads as follows:

"In order to prevent the spread of communicable diseases, the State Board of Health is hereby authorized to prohibit in hotels and in such public places, vehicles or buildings as it may designate the providing of a common towel, and the Board may establish rules and regulations for this purpose."

Then follows the penalty clause.

Regulations were made and published just before June 1, when the law went into effect, but they were modified at the last meeting of the Board to read as follows:

"It shall be unlawful to provide a common towel:

"(a) In any lavatory used in connection with a public institution, school-house, hotel, restaurant, theater, or public hall; or

"(b) In lavatory used in connection with a railroad station, railroad car, steam or ferry boat."

The term "common towel," as used in these regulations, shall be considered to mean a roller towel or a towel available for use by more than one person without being washed after such use.

Chapter 263, Acts of 1912, requires that insect powders containing compounds of fluorine must bear a poison label. This law was passed because in a number of instances insect powders known as roach salts had been sold as Rochelle salts and a number of cases of poisoning had resulted therefrom.

Legislation concerning drinking water on trains was enacted in Chapter 581. This act in effect requires that the individual drinking cups instead of reposing in the pockets of the trainmen must now be contained in receptacles close to the water tank. Individual cups, however, are not required in private cars, sleeping cars, dining cars or parlor cars.

The general power for the enforcement of this law is in the hands of the State Board of Health.

Chapter 486 of the Acts of 1912 requires that no stable may be located in any city or town having more than 5,000 inhabitants unless licensed by the municipal board of health. This law reads now as follows:—

"No person shall erect, occupy or use for a stable any building in a city or in a town having more than five thousand inhabitants unless such use is licensed by the municipal board of health, and, in such case, only to the extent so licensed. The provisions of this section shall not prevent any such occupation and use which was authorized by law on the fourth day of May in the year eighteen hundred and ninety-five, to the extent and by the person so authorized, but the board of health of such a city or town may make such regulations or orders relative to the drainage, ventilation, size and character of stalls, bedding,"—these being additions, "size and character of stalls, bedding"—"number of animals and the storage and handling of manure in any stable in their respective cities or towns as in their judgment the public health requires."

By Chapter 652 of the Acts of 1912 the business of cold storage of certain food products was placed under the supervision of the State Board of Health. It is provided that cold storage establishments must be licensed by the State Board of Health and must make quarterly reports to it as to the amount and character of food products stored within their precincts.

No food product may be kept in cold storage more than 12 months and it must be marked with the date of entrance to the cold storage warehouse. In all places in which cold storage products are sold throughout the state must be posted a sign stating that "Cold storage products are sold here." Food products may be kept in cold storage longer than 12 months by special permission secured from the State Board of Health. The Board is allowed to make rules and regulations which must be carried out by the different establishments under penalty.

Chapter 489 prohibited untrue and misleading advertisements and it was hoped that, through this act, various patent medicines might be eliminated from the advertising pages of our newspapers, but careful reading shows that it is very doubtful whether this chapter will be of any special value in this respect. The law for instance states that individuals or corporations must "knowingly" make or disseminate untrue information, and the persons making accusations have to prove that it is untrue and calculated to mislead, so that the carrying out of this law or prosecution under the law will be very difficult indeed.

The law in relation to isolation hospital and hospitals for tuberculosis which was passed in 1911 was found to be defective in some respects and was modified in 1912 so as to be a practicable measure.

The requirements of different cities and towns vary tremendously and it was found very difficult to enact a law which would fit all situations. Under these circumstances the legislature saw fit to leave to the State Board of Health the decision as to what arrangements should be made in special local situations. There would seem to be no reason, therefore, why in the near future local needs should not be investigated and satisfied with a minimum amount of friction and expense. This law is as follows:

> "Each city shall, and each town may, and upon the request of the State Board of Health, shall, establish and maintain constantly within its limits one or more hospitals for the

reception of persons having smallpox, diphtheria, scarlet fever, tuberculosis or other diseases dangerous to the public health as defined by the State Board of Health, unless there already exists in the city or town a hospital fot the reception of persons ill with such diseases, which is satisfactory to the State Board of Health, or unless some arrangement which is satisfactory to the State Board of Health is made between neighboring cities or neighboring towns, or neighboring cities and towns, for the care of persons having such diseases. All such hospitals established and maintained by cities or towns shall be subject to the orders and regulations of the boards of health of the cities or towns in which they are respectively situated. Plans for the construction of the said hospitals shall be approved by the State Board of Health before the hospitals are constructed, and the state inspectors of health shall annually make such examination of said hospitals as in the opinion the the State Board of Health may be necessary. A city or town which upon the request of the State Board of Health refuses or neglects to establish and maintain such a hospital shall forfeit not more than five hundred dollars for each refusal or neglect:—provided, however, that if, in the opinion of the boards of health of two or more adjoining cities or towns, or a city and an adjoining town or towns, such hospitals can advantageously be established and maintained in common, the authorities of the said cities or towns may, subject to the approval of the State Board of Health, enter into such agreements as shall be deemed necessary for the establishment and maintenance of the same."

Chapter 637 modifies slightly the Act of 1911 as regards remuneration to cities and towns establishing tuberculosis hospitals, and is really complementary to the law just read.

Chapter 468 provides that citizens of the state shall be given preference in admission to the Rutland State Sanatorium, and that a person shall not be re-admitted who has not been a resident of the Commonwealth for six months.

House Bill 1248 provided that Section 39 of Chapter 75, which requires that "such isolation hospitals shall not be established within one hundred rods of an inhabited dwelling-house situated in an adjoining city or town, without the consent of such city or town," should be repealed. This bill, however, was given leave to withdraw.

Chapter 112 is a resolve that "the State Board of Health and the trustees of hospitals for consumptives, acting as a joint board, shall consider and report in print to the general court, not later than January first, nineteen hundred and thirteen, a definite policy for the treatment of tuberculosis in the Commonwealth with special reference to the unification of all health work under one central authority and the division of responsibility as between the Commonwealth and the community, giving due consideration to the relative needs of incipient and advanced cases of consumption and to the means now in use or authorized to meet the same, with any additional recommendations which may seem advisable."

Chapter 52 provides for a state exhibit to the Fifteenth International Congress in Hygiene and Demography. Invitations to take part in this congress were sent out some months ago by the State Committee to every city and town of the Commonwealth, and I understand that the members of this Association have received a great deal of literature on this subject.

It is not necessary, therefore, to call to your attention that speakers from all over the world will be present and discuss all phases of the great subjects of hygiene and demography.

As you know, the powers of local boards of health to make regulations as to the conditions under which food may be sold was seriously questioned in Supreme Court decisions last year, more especially in relation to the so-called "dip tank" decision rendered against the board of health of the city of Boston.

This year a number of bills were introduced in the legislature to correct this situation, but most of them were given leave to withdraw. One, however, succeeded in running the gauntlet and was enacted into law as Chapter 448, which gives to local boards of health the power to make such regulations subject to the approval of the State Board of Health. There is, therefore, no reason now, apparently, why local boards of health should not be able to make properly stringent rules as to conditions under which food products may be sold in their respective localities.

That portion of the law which is new follows:

"Boards of health of cities and towns may make and enforce reasonable rules and regulations, subject to the approval of the State Board of Health, as to the conditions under which all articles of food may be kept for sale or exposed for sale, in order to prevent contamination thereof and injury to the public health. Before the board of health of any city or town submits such rules and regulations to the State Board of Health for approval it shall hold a public hearing thereon, of which notice shall be given by publication for two successive weeks, the first publication to be at least fourteen days prior to the date of the hearing, in a newspaper published in such city or town, or, if none is so published, in a newspaper published in the county in which such city or town is located. Any party affected by such rules and regulations, in the form in which they are presented to the State Board of Health for approval, may appeal to the said board for a further hearing, and said board shall not grant its approval to rules and regulations concerning which such an appeal has been taken until it has held a public hearing thereon, advertised in the manner specified above in this section with reference to hearings before boards of health in cities and towns."

An effort made by those interested in the improvement of the character of medical practitioners in the state by requiring that applicants for registration as physicians should be graduates of medical schools considered reputable by the State Board of Registration in Medicine was lost. (House Bills Nos. 845 and 846.) This movement was supported not only by the so-called regular schools of medicine, but also by the homeopathic schools.

As usual a large number of bills were introduced for the control of the production, transportation and sale of milk. This legislation finally simmered down to a discussion between two bills—the so-called Meaney Bill as opposed to the so-called Ellis Bill. The Meaney Bill placed the power of making regulations in the hands of a paid board of six: three members to be chosen by the State Board of Health and three by the State Board of Agriculture: the administration of these rules to be under local boards of health. The so-called Ellis Bill was favored by the Milk Consumers' League and also by the Committee of the Massachusetts Medical Society. It placed the making of rules in the hands of an unpaid board of five: two to be learned in medicine and bacteriology; two milk producers; and one sanitarian. The carrying out of these rules, once made, was to be placed in the hands of a milk division to be established by the State Board of Health.

The Ellis bill was opposed strongly by representatives of the producers,—also by a considerable number of local boards of health and their milk departments. The opposition of the farmers is easy to understand, for they have always been consistently antagonistic to any inspection by the State Board of Health. The opposition of many local boards of health which have taken little or no interest in the subject is easy to understand. The opposition from more enlightened boards of health is, perhaps, not to be wondered at, inasmuch as the fear was present, and perhaps justified, that State-wide milk inspection might eliminate and render unnecessary successful milk departments already established. There can be no doubt, however, that in any system of milk inspection placed under the State Board of Health there would be no intention or desire to displace any efficient system of local administration.

Efforts to eliminate this ground for opposition by amendment of the Ellis Bill failed, apparently, to convince these more efficient boards of health as to its possible success in meeting the situation as outlined. At all events these bills having see-sawed back and forth in the House for a number of weeks were both finally killed, so that no milk legislation was passed, with the exception of Chapter 448 just mentioned.

House Bill 1251 represents the annual attempt of disappointed candidates for the practice of medicine to escape from the decision of the State Board of Registration in Medicine and provides for an appeal to a board of three physicians to be approved by a justice of the Superior Court. Each member of the board was to be paid not more than $10 daily. That sum was to come from the petitioner and the decision of the board as to the applicant's qualifications was to be final.

Needless to say the bill was given leave to withdraw.

House Bill No. 840 provided that power be given to the State Board of Health to draw up adequate regulations for the control of each disease declared by the State Board to be dangerous to the public health. These regulations were to be carried out by the local boards of health under penalty of not less than $500 for each refusal or neglect. This bill naturally met with great opposition from local authorities and although amended in various ways in an attempt to meet objections to it, it was finally rejected in the Senate.

Uniform practice as to the control of communicable disease is certainly much to be desired. Local boards of health often ask the State Board for information concerning length of quarantine, etc. Would it not be desirable to have a committee of this association draft a set of instructions on this subject so that methods may not vary so much in different cities and towns?

Another bill, the purpose of which was good, but which also failed to pass, was House Bill No. 1561 relative to washing the glasses, cups and other utensils in places where beverages are sold to be drunk on the premises. This bill required that such cups, glasses or other utensils should be washed in full view of the purchaser and by means of a separate cleanser before being again used. Any one who has watched the washing of glasses at a busy soda fountain can realize how much such a regulation as this is needed.

Efforts to escape from decisions of boards of health of cities and towns showed themselves in House Bills 843 and 1564. In the one instance appeal might be made from the local board of health to the county commissioners, board of aldermen or selectmen; in the other, an appeal might be made to the district police or the municipal court within the jurisdiction of which the property of the petitioner is located. Both of these bills, however, failed to receive favorable action.

House Bill No. 609 was introduced to amend the law relating to offensive trades and would have required every establishment in which the breaking out or canning of eggs is concerned to secure a license from the local health authorities in the same manner as slaughtering houses, canning, smoking or rendering establishments. This bill also provided for a more stringent inspection of meat, not only of that meat ordinarily sold, but also of flesh of any horse, ass or mule to be used for human food.

Only the food and drug department knows how great is the necessity for more stringent laws concerning these subjects. The business of dealing in eggs decomposed to varying extent is very large and can be kept under proper control only by very stringent supervision. There is no doubt, furthermore, that considerable horse meat is sold for beef. This bill, however excellent in many ways, was given leave to withdraw. A certain improvement in the situation, however, was secured by the enactment of House Bill No. 222 requiring that all carcasses of neat cattle, sheep, swine, etc., sold in Massachusetts, must after the 1st of September, 1912, bear a brand stating that it has been inspected by a qualified inspector in such-and-such a town whether within or without the state. Up to this time carcasses slaughtered on farms outside of Massachusetts might be brought to the markets of the Commonwealth unstamped under certain federal exemptions. Furthermore, farmers in Massachusetts could slaughter animals less than six months old and sell them without inspection and without stamping. The new law which goes into effect September 1, as above stated, will require all carcasses to be stamped and this fact will render meat inspection much more simple and effective than it has been in the past.

The interest of the general public in venereal disease is increasing very rapidly as shown by House Bill No. 496, providing for the establishment of a commission to devise means for preventing the spread of the disease. Also House Bill No. 1254 providing for the education of the public concerning certain diseases through the issuing of a pamphlet explaining the nature and effects of venereal diseases by the State Board of Health.

Although action on these two bills was postponed, there can be no doubt that legislation on this subject is imminent.

The reporting of venereal disease has already been required in the state of California and also in the city of New York. To be sure the manner of reporting has been modified in that the name of the person affected need not be given, the case being reported simply by office number, but these enactments represent a distinct beginning along lines of prevention and the subject is one which will have to be grappled with in this state before very long.

The possible transfer of communicable disease through the agency of telephone transmitters has, of course, been apparent. House Bill 608 provides for weekly disinfection of all such transmitters.

The amount of labor involved in such disinfection is manifest and it is not surprising that the bill was given leave to withdraw.

After several failures, a bill to regulate the practice of optometry was finally passed by the Legislature and signed by the Governor.

This bill has been combated consistently by the medical profession for a number of years, but, as in a number of other states, the efforts of those who know most about the dangers of this legislation have proved fruitless. It is easy to foresee that many unfortunate individuals suffering from organic disease will be treated for a long time by optometrists with different brands of glasses before it is discovered that the basis of their troubles lies not in errors of refraction but diseases, perhaps, of the kidneys or brain.

That such a valid criticism should be of no value with legislators and governors is hard to believe.

Resolve No. 15 provides for an appropriation of $5,000 to be expended under the direction of the State Board of Health in its investigation of the disease known as anterior poliomyelitis or infantile paralysis. The Board has been investigating this disease, as you know, for five or six years. I am sorry to say, however, that in the last year there have been no discoveries of startling moment to announce.

MUNICIPAL HOSPITALS FOR CONTAGIOUS DISEASES

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Read before the Municipal Health Officers' Section, American Public Health Association, December, 1911, Havana, Cuba

There can be no doubt that the most important progress in medicine and in social economy during the last three decades has been in the prevention of disease. Not only have communities awakened to the fact that by applying the best principles of preventive medicine we can avoid the spread of disease and prevent its ravages, but that in so doing the people of the community are benefited in other material ways. And in no way is the saving of life and the improvement in the general welfare of the people at large better demonstrated than in the results achieved in the handling of contagious diseases in the municipality of to-day.

A most essential part of the equipment of a city in the battle against contagious diseases is an adequate hospital or series of hospitals for contagious diseases.

This is a statement which may be accepted as axiomatic,—yet how slow have the cities of all countries been to appreciate this fact. The first hospital for contagious diseases in general was opened in Glasglow in 1865 and in London in 1871, (Osler). The latter city has now nine hospitals for contagious diseases and one convalescent home—a very proper recognition of their importance.

Why is a municipal hospital for contagious diseases of such great importance? We may state that it is so for several reasons. The most important are:

1. The lack of adequate facilities for treatment of contagious diseases in many homes.
2. The difficulty of securing proper quarantine at home.
3. The nearer approach to absolute isolation in a properly conducted hospital.
4. The far smaller disturbance caused to business and social intercourse when a case of contagious disease is removed to the hospital.

1. The lack of adequate facilities for treatment in many homes cannot be questioned. In Philadelphia in 1910 of 1,925 cases of Scarlet Fever, 1219 were treated in the Hospital for Contagious Diseases. There is no

doubt that the great majority of the patients came from homes where the conditions as to general hygiene, food and medical attention must of necessity have been far less favorable to the patient's recovery than they were in the hospital. In 1910 in Philadelphia of 3,804 patients who had diphtheria, 2,235 were treated in the hospital and 1,569 at home. The mortality of the hospital cases was less than half of those treated outside. This does not in any way reflect upon the medical attendants in whose hands the home cases were. It merely demonstrates that in a hospital the conditions are far superior. The patients are under control—emergencies can be promptly met—facilities for the giving of antitoxin, for tracheotomy and intubation are at hand, and the physicians in charge know that proper food is being given these patients. It requires but a glance at some of the homes from which patients are brought to all Municipal Hospitals for Contagious Diseases to appreciate the fact that for a child to be stricken with a severe disease in one of them and be compelled to remain at home would be equivalent to sentencing it to death.

2. The difficulty of securing proper quarantine at home is a matter of great importance and while not entirely within the scope of our discussion upon the hospital itself, still furnishes one of the great reasons for the hospital's existence, and with the other factors mentioned will be discussed somewhat more in detail in another part of this paper.

Granted then, that a Municipal Hospital for Contagious Diseases is a necessity we may consider it from several standpoints. To me the important matters are

1. The relation of a Municipal Hospital to the Community.
2. The relation of the Municipal Hospital to the individual.
3. The ideal hospital for contagious diseases.

1. The relation of the Municipal Hospital to the community has already been alluded to in discussing the necessity for its existence, and while a great reason for this is the inability of any one properly to care for most of the patients in their home environment, yet the greatest need of the community for a hospital for contagious diseases lies in the fact that it provides isolation, and by isolation only can ideal protection to the public from infected individuals be obtained. Home quarantine must always be faulty because of several factors which depend so entirely upon human nature itself as to be practically ineradicable. First of all we have to deal with the ignorance of parents, friends and relatives concerning the gravity of infectious diseases and the mode of their spread. Then again much of the harm in the spreading of truly contagious diseases such as scarlet fever, measles and diphtheria may be attributed to pure carelessness on the part of those who at one time or another come into contact with the patient. But finally and most important of all we have to deal with,

the innate selfishness of most individuals and their indifference to the welfare or health of the people in general. It seems that people are prone to wilfully conceal the presence of contagious diseases in their homes and to do everything possible to withhold such information from the public. They seem to consider the action of the health authorities as an interference with their rights as citizens. In part this feeling may be due to the deep rooted fear of hospitals dating to a period when they really were places to be dreaded. Yet in part it is due to a certain perverseness, present in greater or lesser degree in all human beings which leads all persons to resent aid from all authorities as an unwarranted infringement on their rights. In short their whole attitude may be stated to show a lack of the altruistic spirit.

In communities in temperate climates such as we find in all the cities of the United States and practically all of those in Europe, the definite contagious diseases with which a municipality must deal in a hospital are Scarlet Fever, Diphtheria and Measles. The first two are eminently suitable for hospital care. Measles, a far more serious disease than is generally supposed might also well be treated thus, were it not for its wide prevalence in epidemics and a positive refusal on the part of both the medical profession and the laity to regard it as anything but one of the very minor ailments of childhood.

A hospital for contagious diseases in order to properly fulfill its function towards the community must be prepared to deal with these diseases efficiently and to prevent their spread throughout that community.

The accommodations therefore must be adequate. Abroad it has been found necessary to have 9-10 beds per 10,000 of population and this is probably a minimum, (Osler). Moreover it should not be thought necessary that cases should be sent into the hospital whether they are proper ones or not. It is a great mistake to allow the sending in of moribund cases, except under unusual circumstances, for they tax the capacity of the hospital without any adequate return to the community or to the individual. The admission of patients should be left entirely to properly trained physicians upon the ambulance of the hospital in conjunction with a corps of competent diagnosticians, whose duty it is to examine and diagnose the cases.

To crowd wards barely adequate with others in whom it is easy to see that no contagious element exists is wrong from every point of view. It not only hampers the work of the hospital but exposes previously non-infected patients to the danger of contagion. I consider that a large part of the success of the municipal institution in Boston has been due to this very discrimination in accepting cases. In the year ending January 31, 1910, of 3192 applicants for admission, 328 were rejected because of the absence of infectious disease. A hospital for contagious diseases has also a very definite capacity for handling patients. When this is exceeded none of those under treatment can receive the proper care or attention. Better where there is room for 100 cases take 100 and care for all properly than to admit 125 and care for none to the very best advantage. Overcrowding in a general hospital is a serious menace to the welfare of the patients—in an institution for the care of contagious cases it makes good care impossible. Therefore it is evident that in an adequate hospital of this kind there must always be a considerable excess of room and facilities over that which is needed upon ordinary occasions, for there are sure to be periods of extraordinary prevalence of one or other of the diseases to be cared for, not to mention the ever-threatening danger of cross-infections. It is true that this tends to make such a hospital even more expensive than it always must be, yet to save money by limiting accommodations would be to save it at the expense of many lives.

It is not necessary that a hospital for contagious diseases should be in the outskirts of a community. There is a common impression that a central location of such a hospital would tend toward the dissemination of disease in its immediate environment, but this view has been abundantly disproven by experience. However in view of the need of much ground for the proper construction of such a hospital it will usually be found far more feasible to place it some distance away from the central districts of the city.

The points in which a hospital touches upon the interests and rights of the community at large are then very plain. Its advantages are manifest—if it be conducted in a manner which experience has shown to be the best.

But while primarily the hospital is for the protection of the community against the spread of contagious disease there are several important features in its relation to the patient.

2. The relation of a hospital for contagious diseases to the individual is in every way as worthy of consideration as its relation to the people in general. There are several duties which the hospital owes to its patients. Primarily they are:

1. The best of care and treatment for the disease from which the patient is suffering.

2. Protection from other diseases which are treated at the hospital.

3. Protection from other diseases which patients may bring into the institution.

Good care and treatment for any disease depend upon the possession of proper facilities and room for the accommodation and treatment of the patient. As has been stated this is true in the very largest degree of patients suffering from contagious diseases. In these, such are included as the proper handling of any and all complications which may arise during the course of the disease and also the patient's discharge in a condition in which he is not a menace to others. I have already mentioned this point in a discussion of the relation of the hospital to the community and shall return to it when discussing the actual arrangement of the hospital.

2. When a patient is admitted suffering from a certain disease it is important that during his stay he should be protected from other diseases treated at the institution. We have no right to take a patient suffering from diphtheria for instance and expose him to infection with scarlet fever or vice versa. As McVail so forcibly puts it we must secure for the patient isolation and protect him from aggregation. In order to protect the patient to the utmost it is important that the promiscuous herding of patients even of those suffering from the same disease, should be avoided. It is of course impossible to achieve the ideal i. e. the isolation of individual patients. The cost of such a procedure puts it out of the question. We can, however, procure isolation to such an extent that our wards do not become hotbeds of infection of various kinds.

It is equally important to protect patients, suffering from any one disease, from diseases which other patients of the same group may be incubating. Thus a diphtheria patient on admission may be in the incubation period of scarlet fever or measles and the infectiousness of these diseases in their initial stages is well known. The arrangements to secure such isolation are various and will further on be discussed in greater detail. Particularly in addition to the contagious diseases we should observe in female children the presence of a vaginitis and if possible such cases also must be isolated.

Therefore, understanding that it is the duty of a municipal hospital to protect the community from patients suffering with contagious diseases while they are ill, to give the patients the best possible care, to protect the patients from double infections, and to send them home harmless, we are ready to consider in detail the ideal hospital for contagious diseases.

The ideal Municipal Hospital approaches as nearly as possible entire isolation of patients. Absolute isolation is impossible, but it is our duty to get as near to it as is possible. Isolation hospitals are more expensive than any other kind because the ratio of patients to attendants is of necessity small if the patients are to be properly cared for and protected one from the other. Therefore economy must be especially considered; not the economy which says "A penny saved is a penny made," but rather that which says "A penny judiciously spent is a penny earned." Isolation is preventive medicine in its fullest and most practical sense, therefore all expenditures, judiciously made, ultimately mean an enormous saving in life, health, and money to the community. In other words a dollar spent to-day in preventions means many dollars saved to-morrow in treating the actual disease.

Hospitals for contagious diseases above all things to accomplish the most good for the money spent must be conducted to secure "isolation and to avoid aggregation." Ineffective isolation brings cross infections and the hospital becomes a distributing center for all the diseases in the hospital. Crowding therefore is a most dangerous and harmful policy. It is avoided by providing sufficient accommodation and by carefully choosing proper cases for admission.

A modern hospital must be upon a large plot of ground and must include beside administration buildings, a series of pavilions for each disease to be treated, with lots of air space between wards and open air corridors and walks connecting them.

The essential portions of a hospital for contagious diseases are an observation or reception pavilion, wards for acute cases, and wards for convalescent cases. Equally important are proper ambulance facilities, an adequate exit building and a combined laundry and disinfecting station.

The observation or reception pavilion should consist of a series of as many isolated rooms with individual bath and toilet arrangements as it is possible to secure. These rooms should be separated by open corridors running at right angles to each other to allow the free circulation of air. These rooms should be so constructed that glass enters largely into the formation of the walls. This serves several purposes, the chief of which is that it enables one attendant to care for and keep under observation several rooms at one time. Moreover by allowing the patients to see each other and still be unexposed, it does away with the loneliness and depression of complete isolation. For the ideal hospital such a building could be utilized by admitting each patient separately into what would be an individual ward and retaining him there until he had safely passed the incubation period of diseases other than that for which admitted. Such an arrangement is hardly practicable because of the forbidding expense. Therefore such a building will find its use limited to the isolation and observation of cases of doubtful diagnosis, for cases with known contagious disease but previously exposed to others, and for the treatment of a limited number of crossed infections, thus doing away with the expense of operating a regular emergency ward.

A further important use to which such a pavilion may be put is in the aborting of outbreaks of cross-infections. Thus it is our experience that a case of measles or chicken-pox developing in the scarlet fever or diphtheria ward, though recognized at the earliest possible moment will infect some, but not all of the susceptible individuals exposed. Unless active measures be taken all susceptibles will ultimately become infected. Obviously the procedure is to isolate all susceptibles one from the other with the certainty that the crop, following the original infecting case will be the total extent of the outbreak.

In the observation building should be situated the receiving rooms, two in number, one to be in readiness always for emergency.

Acute wards should be so constructed as to limit the number of patients in each to not more than six. This serves to reduce to a minimum the dangers and disasters of cross infections.

Convalescent wards, to which patients should be admitted not before they have safely passed the incubation period of other infections, may be larger, holding as high as twenty beds.

Each ward should be equipped with a complete discharge or exit bath consisting of three separate parts—one in which the patient is divested of his clothing, a middle one in which he gets his final bath, and a third or perfectly clean part in which he is dressed in clean clothing handed in from the outside. This I consider a much better arrangement than making this a part of the general exit building inasmuch as it does away with the final mingling of many individuals from different wards and so further tends to promote isolation.

Ideal ambulance service means a clean ambulance, clean blankets, clean bedding, and one patient at a time.

A combined laundry and sterilizing plant should consist of three compartments, a middle one into which all unclean articles are placed, thence to be inserted into sterilizers and boilers built into the walls and opening after the process of cleansing is completed, into the clean rooms on either side.

Suitable and separate dormitories should be provided for the doctors, nurses and attendants. For their accommodation a general exit building on the same three-room principle as the smaller ones mentioned for discharge in connection with the wards, is essential.

The feeding of all can be looked after from a general kitchen, separate dining rooms being provided for doctors, nurses and male and female attendants. By means of food trucks all departments and wards of the hospital may be given safe and perfect service from this same kitchen.

In summing up we may state that the contagious hospital which most nearly fulfills its perfect function is that which attains to its fullest possible extent perfect isolation.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

The quarterly meeting of the Massachusetts Association of Boards of Health was held at Gallup's Island, Boston Harbor, Thursday, July 25.

The members were conveyed to the island on the city steamer "George A. Hibbard" and the quarantine boat "Relief" from Long Wharf at 12.30 P. M. On arriving at the island an inspection of the quarantine station was made and a shore dinner was served.

After dinner the president, Dr. Henry P. Walcott, chairman of the State Board of Health, introduced the business of the afternoon.

On motion, the reading of the records of the April meeting was dispensed with.

New members were elected as follows:

Dr. W. J. McDermott, of the Salem Board of Health.
Harvey B. Pitcher, of the Leominster Board of Health.
Albert K. Mann, of the Chelsea Board of Health.
Dr. J. P. Bradford, of the Acushnet Board of Health.
Dr. Royal Hatch, of the Wellesley Board of Health.

The PRESIDENT. Is there a committee prepared to report?

Report of the Committee on Milk Legislation.

Mr. Bolling, for the Committee on Milk Legislation, presented the following report:

The Committee on Milk Legislation desire to report that practically all the proposed milk legislation failed of passage at the last session of the Legislature. The bills relating to milk that survived were two in number: one that provided for a change in the labelling of containers of condensed milk; the other providing for an inspection of milk testing utensils by the Massachusetts Agricultural College.

GEO. E. BOLLING,
Chairman.

The PRESIDENT. If there is no objection, the report will be received and placed on file.

Is there any other committee prepared to report? If not, the principal business of the afternoon is a paper prepared by Dr. Mark W. Richardson, Secretary of the State Board of Health, Review of Important Bills Relative to the Public Health Considered by the Legislature of 1912. It seemed to your committee in preparing for this afternoon that it was extremely desirable that the members of this Association should be precisely informed as to the course of legislation. It is so difficult to pick it out of the Blue Book that Dr. Richardson has prepared a very careful abstract of the various acts that relate to the public health, and you, gentlemen, must appreciate the fact that no one of these acts is of any value unless you are prepared to support it. The power of the Commonwealth in health matters resides in the body of medical men who represent the boards of health of the Commonwealth. Dr. Richardson.

Dr. Richardson's paper will be found elsewhere in this issue.

The President. It must be quite evident, gentlemen, that our legislators have done the best they could to earn their salaries as far as sanitary matters go. It is difficult to pick out any portion of Dr. Richardson's statement which is a subject for general debate or question, but he will be quite glad, of course, to answer any questions, and any suggestion that may come from any member here with regard to a subject for debate will be very cheerfully entertained by the Chair.

The meeting then adjourned.

HEALTH DEPARTMENT REPORTS

Erie, Pa.

The report for 1911 gives a very good account of the severe typhoid fever epidemic which occurred during the year. Erie has had to be enrolled amongst the list of American cities which have persisted in drinking a polluted water supply until retribution came, in this instance in the form of 1,067 cases of typhoid fever with 135 deaths. Pollution of the city's water took place through the discharge of the city's own sewage. The water intake is located at a point 17,361 feet from the city, 5,000 feet north of Presque Isle, which forms the outer boundary of Erie Harbor. Pollution of the water supply apparently only takes place when there is present a lake current from east and west, around the Isle, accompanied by a rapid lowering of level in the harbor. These conditions are produced by winds from various directions, but particularly when there are continued winds from the southwest.

It is interesting to note that, prior to the typhoid fever epidemic, there was a marked outbreak of acute enteritis. This occurred in December, 1910, and increased so rapidly that fully one-third of the population of the city was affected before the month ended. The health authorities considered this epidemic due to water pollution. The health department persistently called the attention of the public to the water as a probable source of the existing conditions, but "many thousands remained unconvinced, however, and professed to believe the disease was not typhoid, or if so, that it was due, not to water, but to some subtle miasmatic influence conjured up by the persistent rainy weather which had continued throughout the months of December and January; others, overlooking its widespread existence throughout the city, believed the outbreak to have its source in the milk supply, others in ice, in southern vegetables, in imported fruits, notably bananas, even garbage piles beyond the city limits were looked upon as factors contributing largely to the general ill. Spring waters, of which large quantities were consumed in certain parts of the city, also came in for their share of blame. It was observed by your Board, however, that the malady fell most heavily upon the working classes, among whom, the use of ice in winter, imported vegetables, high priced fruits, spring waters, etc., were looked upon as being unneeded luxuries, and, not having been used by its victims, could not be the cause of the trouble. Milk, too, could be excluded, a rigid comparison of the records of the County Medical Inspector for the State Department of Health and the list of dairies supplying the city, showing that typhoid had not been existent on any of the farms from which these products were obtained.

"Conditions continued to grow worse with great rapidity and the outbreak of winter cholera, noted in December, again made its appearance in a more severe form, adding many thousands to its list of victims; a conservative estimate of cases of this condition, made after a careful canvass of the city, showing that nearly or quite one-half of our total population suffered from it."

Steps were taken to treat the water with copper sulphate, and eventually with hypochlorite. The epidemic immediately commenced to subside. The health department arranged without delay for proper hospital facilities for the sufferers. It would be a good thing if this report could be put in the hands of the officials of those cities who still refuse to take steps to supply a safe water to their citizens.

Dr. John W. Wright, the Health Officer, reports the death rate to have been in 1911, 16.17.

In the division of the report devoted to food supplies, the names of all vendors of milk are given, accompanied by a list of the producers who supply them, together with the score and sanitary rating of the farms.

Similar information is given with regard to ice cream manufacturers. The publishing of these facts should undoubtedly have a good effect on the producers, and stimulate them to improve.

A very careful sanitary survey of the city was made, and resulted in a very general cleaning up. Dr. Wright points out that this clean-up resulted in a marked decrease in the fly nuisance.

Colorado Springs, Colo.

"The most important question which now confronts this department as well as the citizens of our city, from a sanitary point of view, is one which we have long appreciated as being a very vital one and which the public at large is coming more and more to realize as such, viz.: the prevention of tuberculosis."

This is one of the opening statements in the report of Dr. Omer R. Gillett, the Health Officer of Colorado Springs. It is followed by a very sane and logical discussion with regard to the desirability of properly informing the citizens of the extent of this disease. Dr. Gillett indicates that instead of being a disadvantage to the city in having its tuberculosis figures published, it is an advantage, as the Health Department can show a proper realization of the dangers, besides informing the public of the precautions which are being taken to prevent infection.

The death rate for 1911 was 15.03. If corrected for the deaths of tubercular cases, contracted elsewhere, it was 9.78.

The milk sold in Colorado Springs is from tuberculin-tested cows, and all cream that comes to the city to be made into butter is pasteurized before being sent to the churn. There was a marked decrease in the number of cases of contagious disease reported during the year. The necessity for medical school inspection is well emphasized and the recommendation of previous years for the establishment of a contagious disease hospital under the management of the Health Department, is repeated. The report does not contain any financial statement.

As customary this report is well printed and contains some beautiful illustrations of the scenery in this Pike's Peak region.

Asheville, N. C.

"Asheville opens wide her doors to the sick and the well from every clime, but she demands that the sick shall so comport themselves that they shall not become a menace to the health of her citizens or the stranger within her gates.

"It is in health that cities grow; in sunshine that their monuments are builded. It is in disease that they are wrecked; in pestilence that effort ceases and hope dies.

"Therefore, in the not very long ago, you created a Department. You bade it guard the public health. You gave it a trust that may not be broken. You charged it with a vigil that is sacred.

"And you assumed a duty. You tendered fealty to this your greatest department; for had you not bade it watch over the lives of men and women and little children?"

The above is reprinted from the cover of the July, 1912, Bulletin of the Asheville Health Department, which contains the annual Report of the Board of Health.

A number of new things have been inaugurated during the year ending May 31, 1912. One of the most important has been the establishment of a laboratory which has, amongst other things, made it possible to cut down the period of quarantine for diphtheria. Prior to the establishment of this laboratory, all cases of this disease had to be quarantined 28 days; the average length of time with laboratory facilities for making bacteriological examinations has been, during the past six months fourteen and one half days.

A rule has recently been established requiring the weekly disinfection by the Health Department of all moving picture halls. It is also required that the floors and seats of the same shall be wiped daily with a cresol solution.

A systematic inspection of hotels, restaurants, bakeries, candy kitchens, etc., on a scoring system has been installed and has produced great improvements.

The milk supply is of unusually high grade. It comes from tuberculin-tested cows and chemically and bacteriologically has been demonstrated to be excellent.

365 deaths were recorded which gives a death rate of 18.2. However 139 of these deaths were of people who came to Asheville from other States for the benefit of their health. Subtracting these the corrected death rate was 11.3.

In conclusion the health officer emphasizes under the title of "Things needed," the desirability of an incinerator plant, medical inspection of schools, comfort stations, and a new market house.

The report throughout is written in plain, forceful language, and is a good example of how to present the health status of a community in a public document so that it will actually be read and appreciated by the average citizen. Dr. McBrayer is to be congratulated on his report.

Nashville, Tenn.

The estimated population of Nashville in 1911 was 113,122, of which 75,677 were white. The total death rate was 20.19. The death rate for the whites was 15.72 and for the colored 29.24. Dr. W. E. Hibbett, the Health Officer states that during the year, the force of the Department has been increased by the addition of a nurse for Infant Mortality work. The work accomplished by this nurse has been so satisfactory, that the City Council has authorized the Health Department to increase the number of nurses to two or more.

Three hundred and seventy-one cases of typhoid fever with 59 deaths were reported. Of this number 73 were imported cases. With regard to the method of infection, Dr. Hibbett makes the following statements.

"We have had no cases during the year that could be traced to any definite source. In the opinion of the Department, when we consider the excellent quality of the city water supply, which is demonstrated both by bacteriological and chemical weekly analyses, there is no connection between the number of cases and the municipal water supply. The only criticism that we have to offer as to our municipal water is that quite a percentage of our population is forced to use water from other sources which are known to be contaminated, as in every instance where a case of typhoid is reported a careful examination of the drinking water is made and the preponderance of these tests demonstrate that, to say the least, these waters are very suspicious. But until the city is in position to supply such places with city water, the Board of Health is powerless to prevent the use of these waters."

The Health Officer announces the passage of an ordinance, providing for the establishment and maintenance of a Bureau for the Study and Prevention of Tuberculosis The Bureau, besides having an important educational function, is also to have a strict surveillance of all discoverable cases. Free clinics are to be established and home treatment is to be provided for those who are unable to visit the dispensaries.

Lowell, Mass.

The death rate of Lowell, Mass. for 1911 was 18.11, the lowest recorded since 1904, and the second lowest since 1890.

A special investigation was made by the Board during the year, with regard to the infant mortality. Twenty-five per cent. of the total deaths at all ages, were of infants one year or under. The evidence indicates that one of the chief causes for infant deaths was lack of breast feeding. The report states that it may be safely said that 68% of the babies are fed on mother's milk, which the Board of Health consider to be a remarkably good record for this large mill town.

PUBLIC HEALTH NOTES

A New Treatment for Pellagra.

"Dr. Jean Nicolaidi, of Paris, has devised an original method of treatment of pellagra, and a paper on the subject, which he read at the recent International Congress of Dermatology at Rome, is interesting. Dr. Nicolaidi holds that the main changes in pellagra are due to serious interference with nutrition. In order to overcome this nutritional disturbance it occurred to him that a serum might be employed in treatment, and he prepared a serum, which he calls an 'organopolymineralised serum'; its composition is not stated very definitely, but it is said to contain substances extracted *in vacuo* from horse serum, and organic and mineral substances from blood plasma, and it is also made radio-active. The first attempts to treat pellagra with this serum were made in Roumania in 1909, and the results are said to have been so good that he was asked by the Roumanian Government to employ the serum in the following year, and we are told that many patients suffering from the disease were rapidly cured or at least much benefited, and in some cases patients with severe mental symptoms who were in the asylum at Craiova were able to leave the asylum after 20 to 30 injections. During the summer of 1911 Professor Antonini was asked by the Health Department of Italy to arrange for a series of trials of the serum. These trials were made. Patients were taken who had severe symptoms and who had not shown any improvement under any other form of treatment. After about 25 injections all the symptoms had diminished in severity or disappeared, the general nutrition had much improved, and many patients were able to resume their occupations. The improvement in the skin lesions were as marked as the improvement in the symptoms; a change for the better was visible after five or six injections, and after 12 injections every trace of the scales and erythema had disappeared. As to the question of recurrence, only 2 cases out of 50 in Roumania showed signs of any return of the disease, and only 1 case of relapse occurred amongst those treated in Italy in 1911, and this in spite of the fact that the patients had not changed their diet. The results seem to be very encouraging, but it is probable that some of the constituents of this very complex serum take no share in the result."

The Lancet, Vol. 1, No. XXIV.

How Fresh Fish get to Eastern Markets.

The ordinary person who calls up by phone, or even goes to the fish shops in Boston or New York, does not always know just where his fresh halibut or cod comes from; but if he lives farther inland he may fairly be in much greater doubt.

In a recent number of *Ice and Refrigeration*, a full description is given however of where an unusual amount of this fish comes from.

For the last twenty years the Puget Sound cities have taken advantage of the marvellous richness of the sea fauna of that Northern Pacific coast; but till comparatively recent years most of the energy and capital have been devoted to the salmon canning industry. Today this is markedly changing, for while it is true that the canning industry has extended from Ketchikan in Alaska, there has been a growing fleet of vessels engaging especially in halibut fishing on the outside of Vancouver Island and the Straits between that and Queen Charlotte Islands. Most of this trade has been done through Seattle; but the past year has seen two million-dollar plants erected in Canada, one at Vancouver, essentially an American Company operating from a Canadian base and sending their supplies to Chicago, Boston, New York and etc., but fishing in Canadian waters, and the other established at Prince Rupert, Lat. 55° the new city at the western terminus of the Grand Trunk Pacific R. R. almost completed from Halifax on the Atlantic.

The fish companies at Vancouver have steamers which start out with ice in their bunkers, manufactured at the large plant situated on the docks, and which is used to chill the fish while the cargo is being made up. A catch of 300,000 pounds of fish may come in on a single steamer which is rapidly landed on the nearest ground floor cleaning room, when they are rapidly cleaned and beheaded, (this refuse going to make fertilizer). Thence the fish are sent into the freezing rooms which are long rooms with eight rows of pipes as shelves on either side of the passage, through which a double expansion ammonia ice plant sends the gas at temperatures 2–10°,6–15°F. Within 18 to 36 hours the whole cargo is frozen.

From this room the fish are passed into the "glazing" room, where they are dipped twice into vats of pure cold water. The excessive cold in the frozen fish causes an immediate ice coating on the whole fish, and in this condition the fish are wrapped separately in parchment paper and then packed in boxes lined with paper and sent by elevator to the cold storage ware rooms on the 2d and 3rd floors. Here they are kept at +10°, +15° F. until shipped East by rail. They are placed in refrigerator cars which are carefully constructed iron frames with insulating excelsior in the walls. At the two ends of the cars are ice bunkers filled up to the top, and the best cars have false floors and ceilings through which the cold air moves up through the cargo of fish boxes Refilling with ice *en route* eastward may be necessary; but fish so frozen may be kept and are kept up to an average of four or more months in the same state of freshness they had when placed first in cold storage. If such are *de-frozen* gradually through a series of increasing temperatures to 60°F. they will appear fresh and wholesome in the dealer's shops where they should be placed under a glass case for sale.

The precooling and cold storage from keel to the consumer is now the slogan of the fresh fish trade; and, as compared with old fashioned methods for supplying fish even in the local markets, has marked the application of pure science to the problem of supplying this important article of food to populations lying hundreds and thousands of miles from the source of supply. *P. H. B.*

Hookworm from the Orient.

Passed Assistant Surgeon Glover of the Public Health Marine Hospital Service at Angel Island, California, reports the results of a considerable number of examinations of Oriental immigrants for hookworm and other parasites. This work is undertaken as a part of the physical examination to determine whether or not the immigrants may be admitted to the country, and consists of microscopical examination and a sample of feces. Chinese, Japanese, and Hindus examined in this manner demonstrated a very considerable percentage of infection; Chinese females showing the smallest percentage, 20, and Hindu males the largest, 63. There is evidence that Japan, or at least certain districts of it, is heavily infected with hookworm.

Doctor Glover points out the very real danger which the immigration of Orientals may furnish, not only from hookworm but from other tropical diseases, such as Amebiasis and malaria.

Journal of the American Medical Association, Vol. 58, No. 24.

"Shuttle-Kissing."

"An interesting report to the Home Office and to the Local Government Board, upon an inquiry into the alleged danger of the transmission of certain diseases from person to person in weaving sheds by means of 'Shuttle-Kissing,' has been issued as a Parliamentary paper. The matter affects workers in the cotton and linen industries, and evidence was taken in a number of towns in Lancashire, and in Glasgow, Belfast, and the north of Ireland. No evidence was found to support the allegations that in certain particular instances transmission of disease took place by 'shuttle-kissing.' The committee engaged in this inquiry report: 'Indeed, we might safely go a step further and say that we have not found evidence in any instance which would justify suspicion that the shuttles had been the means of transmitting infection.' They add that they are in hearty concurrence with the view that the practice is objectionable, and that it is desirable that some other method of shuttle-threading should be adopted, but this opinion they hold, apart from the medical or public health aspect of the question, on the ground simply of decency and cleanliness of habit. As far as cotton is concerned, the committee hold that practical alternatives to the present form of shuttle should be found and the 'shuttle-kissing' is no longer a necessity. As regards flax, they were forced to the conclusion that the hand-threading shuttles, in their present form, may not be suitable for flax, and there was considerable doubt whether the mechanical suckers would pull the stiff fibre through the eye, but they found, on the other hand, when they visited Belfast, that in some sheds slight alterations were being made in the design of the shuttles to enable the weaver to push the thread through the eye with finger and thumb. The committee think that threading with the mouth (the weaver in the act puts the side of the shuttle to his mouth and uses an inspiratory suction to draw the thread through the eye, hence the term 'kissing the shuttle'), might be generally avoided by adopting such measures, or by the use of hooks of various forms, similar to a crochet-hook, which can be inserted through the eye, and will draw back the weft. While in agreement that the present method of threading is uncleanly and may even be a possible means of spreading infection, the committee do not think the time is yet ripe for insisting, either by regulations or by Act of Parliament, on the abolition of the existing form of shuttle. They feel that the facts elicited do not justify drastic legal action at present. The report is signed by Mr. Gerald Bellhouse (one of the superintending inspectors of factories), Dr. W. W. Fletcher (medical inspector of the Local Government Board), and by Mr. D. J. Shackleton (late senior labour adviser, Home Office). Dr. H. T. Bulstrode, one of the original members of this departmental committee, died before the inquiry terminated."

The Lancet, Vol. 1, No. XXIV.

Mississippi Floods and Typhoid.

An example of the extreme seriousness of flood conditions along the Mississippi River from the sanitary standpoint is offered by the recent experience of Memphis, Tennessee. In this spring's disastrous flood the river rose over the levees at the northern part of the city, the polluted water backing in and covering an artesian well district from which one-third of the city's water supply was obtained. After the river reached a certain stage the water obtained from these wells became turbid and gave analytical evidence of pollution. Cases of typhoid fever appeared and the health authorities called in George W. Fuller, of New York to take charge of the situation.

The polluted water was restricted to the commercial district, warnings were issued, and pure water was brought into this district. When the river receded, an examination indicated that the infection had entered through cracks in the brick wall protecting one of the artesian wells. The polluted supply was then disinfected with hypochlorite of lime and all suspected mains were thoroughly flushed out. To prevent a repetition of this disaster, resulting in some 500 cases of typhoid and 30 deaths, it is proposed to raise the height of the levees to a thoroughly safe level. The experience in Memphis is significant of the sanitary dangers attending flood conditions in general, and should be a warning and example for health authorities in districts where similar conditions are likely to occur.

Eng. News. June 13, 1912. Vol. 67, No. 24.

The Milk Supply of New York City.

The bacteriological and sanitary condition of New York's milk supply has recently undergone investigation by M. C. Schroeder of that city's health department. A large number of bacteriological analyses of samples of milk were made at various points between production and consumption. Studies were also made of the age of milk delivered in the city, as well as of methods of cooling, temperatures at different points, and the efficiency of pasteurization Comparisons are offered of the bacterial contents of raw milk sold in cans as compared with that in bottles, and this work has been duplicated for heated milk. Some of the forms used in keeping track of the work are reproduced.

Dr. Schroeder finds that whereas, "The greater portion of the milk is delivered by the dairymen to the creameries with low bacterial content, namely, less than 50,000 bacteria per c. c," that the greater portion of milk sold in New York City as raw milk, whether in cans or bottles, contains from 50,000 to 1,000,000 bacteria per c. c. and a considerable percentage contains over 1,000,000 bacteria per c. c." The temperature of the milk delivered to the creameries in the summer months is too high, and the icing which the milk receives is insufficient.

Sterilization of cans and bottles is recommended. "A greater part of the milk sold is from 36 to 48 hours old, but a considerable portion is from 72 to 96 hours old, and some even more than 96 hours."

Journal of Infectious Diseases XI–1, July, 1912.

The Cultivation of the Leprosy Bacillus.

Three organisms to which etiological significance has been ascribed have, in the main, been isolated from human leprosy. The first of these is a non-acid-fast diphtheroid bacillus first described by Kedrowski, and according to him, endowed with marked powers of pleomorphism; the second is an acid-fast chromogenic bacillus first described by Clegg, difficultly cultivated in the early stages but after a few transfers growing luxuriously as a saprophite and with characteristic yellow pigment; the third is a permanently acid-fast bacillus (Duval), resembling more closely the original bacillus of Hansen and very difficultly cultivated. Doctors C. V. Duval and C. Wellman of Tulane University made a critical study of these organisms with a view to discovering which is the true B. Leprae.

In the course of their experiments they have been unable to discover any evidence of pleomorphism as between these three organisms. The chromogenic bacillus, although isolated from a large percentage of their cases, they now conclude, has probably little claim to being the cause of the disease. The acid-fast bacillus of Duval, on the other hand, is more probably the true B. Leprae, although the present authors do not believe they have as yet definitely established this. A pleomorphic diphtheroid bacillus corresponding to Kedrowski's was isolated from one of their cases, but they do not ascribe to it much importance, nor to the entire question of pleomorphism. The present paper contains not only the reports of their new original work but also useful historical and critical information.

Journal of Infectious Diseases XI–1, July, 1912.

Cavities in Teeth as Disease Carriers.

"At the beginning of an investigation to determine the best ways of terminating an epidemic of scarlet fever that had infested our city for three years, school inspection was instituted.

After the medical inspection was begun it took just sixteen days to free the public schools of the disease. Then our attention was directed toward a medical examination of the third grade and a dental examination of the third and fifth grades. Our fair city then had seven dentists, one of whom, James R. Pagin, D. D. S., was secretary of the board of education. Because of this position Dr. Pagin thought best not to do any of the examining, and we had six rooms to examine and six dentists to do the work.

190 children were examined.

937 cavities were found.

454 cavities were in permanent teeth.

77.9 per cent. of the pupils examined had cavities in permanent teeth.

50 had had scarlet fever during the present epidemic and two hundred thirty-eight cavities were found in their teeth.

2 of these had no cavities.

1 had 12 cavities.

2 had 10 cavities.

From this time on we looked to the condition of the teeth as well as the condition of the tonsils and nose, and insisted on all cavities being filled at once upon release from quarantine. I believe these cavities to be fine incubators for all pathogenic bacteria and cavities are known to contain the germs of diphtheria, pneumonia, tuberculosis, influenza and other known infections which enter the body through the respiratory tract, therefore, inasmuch as scarlet fever, measles, whooping cough, and mumps are believed to be respiratory infections it is fair to presume that the cavities would be equally efficient incubators for these and other diseases.

In the near future I predict a dentist will be on the board of health staff and the teeth of all patients will be filled or the cavities sterilized before release from quarantine.

The work done last year in the schools was done with no expense to the board of education except blanks, and was so satisfactory that it is being continued this year and a reasonable compensation is to be paid."—Otis B. Nesbit, M.D., President Valparaiso, Ind., Board of Health.

Bulletin, Indiana State Board of Health, May 1912.

Enteritis and Typhoid at Rockford, Illinois.

In January and February, 1912, the city of Rockford underwent a very severe epidemic of a diarrheal disease, some 10,000 persons of a population of 45,000, and a smaller epidemic of typhoid fever of about 200 cases. Professor Edwin O. Jordan of Chicago University investigated the outbreak and showed that it was due to the pollution of a pure artesian water by contaminated ground water, which surrounded permeable basins. The water was drawn down in these basins or wells to a unusually low level on account of an unusual demand upon the fire service. Under these conditions the polluted ground water gained entrance and the epidemic resulted.

This is another case in which laboratory analysis has failed to indicate the danger which exists only under unusual conditions which emphasizes the importance of sanitary inspection, or in the words of Professor Jordan;—"In conclusion it may be said that while there is perhaps nothing remarkably novel in the cause and general character of the Rockford epidemic, the necessity of examining all the features of a water supply is further emphasized by this occurence. Analysis alone, not controlled or supplemented by inspection, may give no useful information, or may even mislead."

The engineering aspects of the question are dealt with by Professor Jordan in a short article in the Engineering News, Vol. 67, No. 24. The epidemic is more fully described by the same author and E. E. Irons in the Journal of Infectious Diseases, Vol. 11, No. 1, July, 1912.

Studies on Endo's Medium.

The chemical changes underlying the color reaction of this medium have been made the subject of investigation by E. R. Harding and Z. Ostenberg of Stanford University. The original explanation given by Endo of the color production by B. coli was that the fuchsin was reduced by the sodium sulfite, a colorless compound being formed, which again became red under the influence of acid produced by the organism. The present investigators have identified the colorless rosanilin salt with the well known "Shiff's aldehyde regent," and seem to have shown that the restoration of color is due not to the production of acid but of aldehyde. Endo's original explanation, and the one currently accepted, is thus overthrown.

Following up this discovery Harding and Ostenberg have experimented with the medium substituting other carbohydrates for lactose. Their results here confirm their earlier conclusion as to the responsibility of the aldehyde. Using xylose and arabinose the investigators believe they have arrived at a definite and useful means of subdividing the paratyphoid group.

Journal of Infectious Diseases, XI-1, July, 1912.

Dr. H. W. Hill.

Dr. H. W. Hill has recently severed his connection with the Minnesota State Board of Health and become Director of the New Institute of Public Health at London, Ontario. This institution is maintained in connection with the Western University, and Dr. Hill will be in charge of the postgraduate course leading to D. P. H. degree. He will also have charge of the general publicity work throughout the province concerning public health matters and will work in connection with the Ontario Provincial Board of Health.

Dr. Hill terminates a period of sixteen years' public health service in the United States, which began with the Louisville, Ky., Water Filtration Works in 1896. Dr. Hill's many friends in this country will wish him every possible success in his new position.

Dr. W. P. Gerhard.

Dr. Wm. Paul Gerhard, the well-known Consulting Sanitary Expert, is leaving shortly for Europe, to attend the International Conference on Public and School Baths at Scheveningen, Holland, as the official delegate representing the United States. He will also attend the "City Planning Exhibit," at Düsseldorf, Germany.

Dr. Gerhard has recently donated a library of 265 volumes to the Sanitary and Biological Department of the College of the City of New York where the collection will be known as the "Dr. Gerhard Library of Sanitary Science."

Industrial Anthrax.

The June number of the *Journal of Hygiene* contains an interesting and useful article on the "Detection of Anthrax Spores in Industrial Material." The authors are Dr. E. E. Glynn, of the University of Liverpool, and F. C. Lewis. This is pointing to the fact that anthrax is still fairly common in Great Britain, there being 79 human cases with 12 deaths in 1910 (Great Britain and Ireland), and the best methods of detecting infection in different kinds of industrial material are discussed.

Their summary and conclusions are as follows:

"(1) There are two methods of examining industrial material for anthrax spores, viz., agar plate cultures and the inoculation of guinea-pigs.

"(2) Though no worker has yet made a large series of examinations of equal portions of the same material by both methods simultaneously, yet the available evidence indicates that animal inoculation is superior, provided that guinea-pigs, not mice, are employed.

"(3) It is better to inoculate two guinea-pigs than one, and to use the centrifuged deposit of the watery extract, though this practice may also increase the mortality from pathogenic anaerobes.

"(4) The inoculation of guinea-pigs is more successful than plate cultures mainly on account of the larger quantity of watery extract usually tested, which more than counterbalances the disadvantage that some of the animals died from anaerobes before they develop anthrax.

"(5) If plate cultures are employed it is essential to examine the superficial colonies after a short incubation, probably 12 to 16 hours is the most suitable.

"(6) Anthrax spores have been demonstrated by the inoculation method in 21.3% of 141 samples of industrial material, supposed to have produced anthrax in Liverpool amongst those who handled them. Of these samples 28.6% were from hides, 22.2% from wool, 20.6% from hair and 7.1% from bones. The largest proportion of infected samples came from Singapore.

"(7) Anthrax spores have been demonstrated in one sample of hair 'disinfected' with 5% fluid of high coefficient at 100 degrees C., and in two out of six samples of hair disinfected in Germany probably by steam at 105 degrees C. It is practically impossible to completely sterilize certain industrial materials without seriously damaging them; yet partial disinfection should on no account be abandoned, because the perfect method has not yet been discovered.

"(8) Anthrax appears to be steadily increasing among domestic animals, and consequently a larger number of agriculturists are becoming infected. The reason for this dissemination amongst animals is still obscure.

"(9) We have found *B. anthracis* in sample of pea meal used for feeding cattle confined to a shippon, one of which died of anthrax. The meal was probably infected from the sack.

"(10) Anthrax is preventable among men and domestic animals, and its ultimate suppression depends largely upon the certainty with which bacteriologists can demonstrate the presence of absence of bacilli in suspected industrial food, or other materials."

Removal of the Tonsils.

"In the Maryland *Medical Journal* for June, Dr. John N. Mackenzie, professor of laryngology and rhinology in the Johns

Hopkins University, inveighs against the indiscriminate removal of the tonsils, which he attributes not only to mistaken views of the American profession, but to insistent demands of the laity. He points out that the functions of the tonsils are at present unknown. Whether they are portals of entrance or exit for infection, whether they protect the organism from disease or invite its entrance, whether the pathogenic bacteria sometimes found in them are coming out or going in, whether they are manufacturers or storehouses of leucocytes, and whether their destruction means the removal of a battle-line against the passage of infection from the throat to the neck cannot be stated. Until these questions are settled the final word on the removal of the tonsils cannot be said. Whatever its functions, the tonsil is not, as is generally believed, a lymphatic gland. Its physiological integrity is important in childhood. It appears in the fourth month of embryonic life, attains maturity at the end of the first year of infancy, and about puberty tends to diminish its size. It does not develop as a lymphatic gland from a plexus of pre-existing lymph vessels in the mesothelium, but as an ingrowth of endothelium from the second branchial pouch, and therefore resembles the thymus and thyroid, which originate respectively from the third and fourth branchial pouches. All these bodies are produced by inbudding of the endothelial lining of the primitive pharynx. In a recent careful study in comparative anatomy, Gordon Wilson, of Chicago, has shown that the tonsil secretes or excretes into the pharynx. The role of the tonsils as portals of infection Professor Mackenzie considers greatly exaggerated. He admits that they are so in certain cases, but to a less extent than the more abundant and receptive lymphatic structures of the nose and naso-pharynx. The tonsils are frequently held responsible for the results of morbid conditions situated elsewhere. If obstruction to respiration due to adenoids be removed, the tonsils will often take care of themselves. Even if they remain large and are causing no trouble they may be safely left, and as growth of the child proceeds they will become less conspicuous. The mere size of the tonsil Professor Mackenzie considers no indication for removal. A large tonsil does not necessarily mean a diseased one, nor does a small one mean a healthy one. That the tonsil has some important function is shown by its frequent growth after enucleation. Another point is that the tonsils play an important part in the mechanism of speech and song. They influence the action of the surrounding muscles and modify the resonance of the mouth. On the other hand, they may be so enlarged as to cripple both these functions, and then should certainly be removed. The changes in anatomical relations produced by tonsillectomy cannot be foretold, no matter how skilfully the operation is performed. The adhesions and contractions which sometimes follow, even in the best of hands, often ruin the singing voice. Professor Mackenzie shows that he would long hesitate before advising the operation in a great singer, or one depending on the voice for a livelihood. He considers that tonsillectomy is a dangerous operation which should be done only in a hospital or other place where there is every facility to meet the gravest emergency. It should be done only by a surgeon skilled in its performance, thoroughly equipped for every accident, and fully alive to the fatalities which have sometimes followed. He does not decry the many excellent measures which modern ingenuity has devised for operation on the tonsil when there are definite reasons for their application."

Annotation, *The Lancet*, June 29, 1912.

After the Summer Vacation.

"It has been found at Liverpool that many cases of infectious disease amongst school children, which would, during school terms be notified, are not notified during the vacations, and children who are still infectious or who may have been in contact with infection, may, therefore, return to school whilst convalescent. To obviate these occurrences, Dr. E. W. Hope has advised that on the reassembling of the scholars after vacations, the head teachers of the infants' departments should be instructed to enquire of the children if any of them have been ill during their vacations, and refer all possibly infectious cases to the medical officer of health, whose staff will make the necessary home inquiries."

The Medical Officer, July 6, 1912.

Rats and Plague.

The quarterly bulletin of the Louisiana State Board of Health is devoted entirely to the rat and its relation to the public health. This subject is, of course, of special interest in Louisiana at the present time. The following from a recent issue of the *Daily Picayune* is also of interest in this connection.

"Officials of all railroads coming into New Orleans will meet with the local health officers in the office of the State Board of Health in the New Orleans Court Building tomorrow at 10 o'clock to discuss the advisability of rat-proofing all freight cars used to transport freight to and from the city. It is well known that freight cars are carriers of rats and plague infection can be spread from town to town by this means. In all cars an inside wall extends half the way to the top. The top of the wall is not sealed, allowing rats a hiding place between the inside and outside walls. The health authorities want the top of the former covered."

Ventilation of School Rooms.

The recent report of a special committee of the New York City Board of Education on ventilation of school rooms contains many important recommendations of interest, among them the following:

1. That the temperature of class rooms in school buildings shall range between 60 and 68 degrees Fahrenheit, and of halls and passageways between 60 and 65 degrees Fahrenheit, unless the outdoor temperature be higher.

That a large size tested thermometer showing temperatures between about 50 and 100 degrees Fahrenheit, be hung from the ceiling in front of the teacher's desk in each class room.

That the thermostats be set at 65 degrees Fahrenheit.

2. That the windows in all rooms be opened for three minutes after each class period, the children meanwhile doing physical exercise, and between 12 o'clock noon and 1 o'clock as part of the school routine.

3. That wherever there are transoms over windows or doors or other openings into the halls from class rooms they be kept open, at least in part, the whole time.

4. That in new buildings, windows be made in small sections, with pivots and adjusters.

That in schools which are provided with artificial systems of ventilation the systems be operated only when inclement weather forbids adequate window opening.

That a concisely worded card of instructions be mounted in each class room.

That the principals of evening schools be permitted to order the operation of the ventilating systems.

That the amount of heating surface in the halls and class rooms be reduced.

That three visiting engineers, to assist in the operation of heating and ventilating plants, be appointed.

5. That every possible encouragement and facility be given by the Board of Education for the establishment of open-air classes.

That every practicable facility be offered to any responsible committee which wishes to take observations in the schools as to ventilating and heating conditions.

Sewage Farms and Typhoid.

"A serious epidemic of typhoid fever is reported from Retford. Dr. A. E. Manners Smith, M. O. H., has had the assistance of Dr. Henry Handford, C. M. O., in investigating the causes of the attack, which is believed to be connected with the milk derived from cows grazed at the borough sewage farm. How the milk became contaminated has not yet been ascertained. Over thirty cases have been notified, and the small-pox hospital is being used for the reception of patients."

The Medical Officer, July 27, 1912.

An Important Fly Bulletin.

One of the most important fly bulletins yet issued is that which has recently come from the office of the State Board of Maine.

In the introduction it is pointed out that lots of people come every year to take a look at the beauty of the natural scenery of Maine. "Most of the visitors are pleased, but, now and then, some of them, unfortunate in the choice of a place or hostess, says 'flies'." The following three reasons are given why the fly nuisance should be done away with:

1. It is a rational protection against the spread of infectious diseases.

2. It will preserve us from the misfortune of losing our self-respect and the respect of others.

3. Neatness and cleanliness are a good bit of financial investment; they tend to fatten the wallet, particularly if we are catering to the wishes of our modern and better sort of people for food, refreshments or air.

Individual Drinking-Cups.

"Most teachers who have tried the plan of having individual cups in the school where the attendance is large, have found themselves involved in a number of difficulties. Some of these difficulties have been overcome in the adoption of the following plan, which for over a year has been in practice in one of the largest primary schools of the state.

"On the first day of school the teachers asked each child to bring on the following day a square of colored cotton cloth of such a pattern, or so marked, as to be easily recognized. The last half hour of the second day's session was used to make these squares of cotton into bags. The teacher explained to the pupil that these bags were for drinking-cups and asked each child to bring a small agate or tin cup which was to be kept in the bag. This bag was to be hung on the pupil's hook in the cloak-room or on the framework of the desk in rooms when the pupils did not pass through the cloak-room in going for a drink. In either case, the cup is always ready for use, being protected by the bag from the germs and dust of the school-room, and at the same time much less in the way of the pupil than when on or in the desk. The cup is less likely to be lost when in the bag and as the bags are easily distinguished there are seldom disputes as to the ownership of the cup.

"Nails or hooks are provided in the yard where the bags may be hung during recess.

"On Fridays the pupils are asked to take the cups home with them and see that they are carefully washed and scalded, and occasionally the bags also are washed. The plan thus affords an opportunity for training in sanitation as well as a practical method for getting, and, what is far more difficult, keeping individual cups."

Miss N. C. Stevens in *Florida Health Notes.*

Remuneration for Board of Health.

"I know of no person or persons connected with the city administration who work without any remuneration whatever, except the members of the Board of Health. While they do not have as many meetings as the Board of Aldermen, I am quite sure their work is of equal importance with the Board of Aldermen. And I think the city of Asheville has accepted this work as a gratuity long enough. Occasionally a member of the Board of Health is called upon to go out and inspect certain conditions in order that he may act intelligently upon the same.

"We recommend that the Board of Aldermen pass a resolution or ordinance paying the members of the Board of Health four dollars for each meeting attended, whether it be Board of Health or the Joint Health Board: those members of the Joint Health Board who are *ex-officio* members of the Board of Health to receive no extra compensation when they attend meetings of the Joint Health Board."

Dr. McBrayer in *Bull. of Health Dept.*, Asheville, N. C., July, 1912.

Insects.

The February, 1912, Bulletin of the Pennsylvania State Department of Health is devoted to those insects which have been shown to transmit disease. The general biological facts concerning these insects and, in each instance, the remedies to be used to eradicate the pests are briefly indicated. Attention is paid to mosquitoes, flies, fleas, cockroaches, bedbugs, house ants, the various kinds of lice and the itch mite.

An Epidemic of Trachoma at Hudson.

"The Training School for Girls at Hudson is suffering from an epidemic of trachoma The disease was probably introduced into the institution last March by a girl from New York, who had been treated for this trouble for a year past and who evidently was not cured when admitted. Since March one hundred and twenty cases have been reported to the State Department of Health. A special investigation of the epidemic was recently made by Dr. H. D. Schenck, consulting ophthalmologist to the department, and the eyes of eighty children were examined, all of whom, with the exception of three doubtful cases, showed evidence of the disease. About one third of the population of the institution have become infected through neglect of quarantine measures. Special instructions as to quarantine and treatment were given to the house physicians and officers which, if carried out faithfully, will free the institution from the disease, although it will be several months before the eyes are all well.

Monthly Bull. N. Y. State Dept. of Health, July, 1912.

Infant Mortality in Canada.

"The most complete report we have yet seen relating to the problem of infant mortality in Canada is from the pen of Dr. Helen MacMurchy dealing with the Province of Ontario. It is disquieting to find that she has first of all to admit that the laws with regard to the registration of births are so inadequately carried out that but little reliance can be placed upon statistics relating to birth-rates and, therefore, also to infant mortality. No one, she says, seems to know much about the registration of births in Ontario. The law actually requires, under a maximum penalty of two pounds, that a birth shall be notified to the district registrar within 30 days of its occurrence by the father or mother of the child, or by the occupier of the house in which the child is born, or by the nurse present at the birth. If a doctor is in attendance he must notify the birth to the registrar forthwith. By comparing the list of baptisms with the list of children registered in a given area within a stated period it was found by Mr. R. E. Mills, B. A., that only about 75 per cent. of the total number of births came to be registered, a circumstance which is much to be deplored. Still worse, out of 636 births registered in Toronto, as many as twenty were registered twice. The reasons given for this neglect are the lack of training of the inhabitants in the necessity for registration, and the fact that the registrar receives only 20 cents for each registration. Prosecutions for non-registration appear to be quite unknown. Better registration might be secured if prosecutions were undertaken, or if doctors were paid a fee for notifying the fact of a birth having taken place. Subject to the qualifications referred to, the infant mortality rate in 1907 was 120 per 1,000 births in Ontario, and 148 per 1,000 in Toronto.

"Dr. MacMurchy deals at some length with the causes of infant mortality and makes some valuable suggestions for reducing it. These include the prompt notification of a birth for which the first person to do so should receive a fee of one shilling, the Registrar-General supplying doctors with stamped addressed post cards for use in notifying; a grant from the Provincial Government towards the salaries of doctors and nurses employed in infant welfare work in any municipality; a grant from the same source for an infant nursed by the mother in any Provincial institution, hospitals, infants' home, etc., and a smaller grant if the child is not nursed, and the establishment of a bureau of infant care and management or infant welfare under the control of the Secretary of the Provincial Board of Health. It is further suggested that every certificate of death relating to a child under twelve months old should state the exact method employed in the feeding of the child."

The Medical Officer, July 27, 1912.

Hookworm Disease in North Carolina.

Dr. W. S. Rankin, in his annual report, makes some interesting remarks under the title of "The Effect of Hookworm Disease Exaggerated." He points out that of 6,858 death certificates filed during 1911, only two certificates assigned hookworm disease as the cause of death, and on only one certificate was this disease noted as a contributory factor. He concludes this portion of his report as follows:

"Until this time the public mind has rated hookworm disease altogether on the *frequency* of infection and utterly ignored the equally important factor, the *severity* of the infection. In order to appreciate the importance of this disease from a public standpoint, it is not only necessary to know that 800,000 North Carolinians carry the parasites in their intestines, but it is equally necessary to have some reasonable idea, based upon an ample investigation, as to the number of worms the average host contains. We must recognize the principle that parasitism is one thing; pathogenesis another thing. Has the average North Carolinian, has the average Southerner, ten, thirty, fifty, one hundred, or two hundred hookworms? For thirty-five college students from which the worms were carefully counted by the Allen J. Smith method, there was an average of but twenty worms. A letter from Dr. Bailey K. Ashford of Porto Rico, in answer to an inquiry from me, states that he regards from three hundred to five hundred worms necessary to produce recognizable symptoms; that it would require from seven hundred to fifteen hundred to produce medium or rather severe infection, and from two thousand to three thousand to produce death.

Reasoning from the facts in the case, the vital statistics from this State, a very large part of the 30 per cent infection of our people is so light as to be, *comparatively* speaking, a case of parasitism more than a condition of pathogenesis; and hookworm disease ranks, in North Carolina, among the other important causes of death as fourth or fifth in the list, somewhere near malaria, a disease which resembles it in geographic distribution, in frequency of infection, and in its anemia-producing power. It is necessary for public health administrations to recognize preventable diseases in their relative importance, for partly upon that should depend the distribution of their forces in the fight against the different divisions of the foe."

Compressed Chlorine versus Hypochlorite.

Dr. D. D. Jackson, in the June 15, 1912, *Engineering Record*, contributes a short article on "Chlorination at Cleveland." Dr. Jackson points out that since the installation of the new four-mile water intake, that the water supply of the city has been in a satisfactory sanitary condition at all periods of the year, with the exception of the short intervals during which the annual breaking up of the ice has occurred.

The chlorinating plant was placed in operation in September, 1911, but disagreeable tastes and odors were noticed from time to time, which were traced to the use of unnecessarily large amounts of chlorine. Dr. Jackson makes the following statement with regard to the use of liquefied chlorine in place of hypochlorite:

"Compressed chlorine, liquefied under pressure, is now on the market sold in 100-lb. cylinders and can be had at about 8 cents per pound, about double the price of hypochlorite of lime as far as available chlorine is concerned. It has, however, many decided advantages over hypochlorite in that it is a pure and definite product which is absorbed by the water as a gas. It is easier to apply with regularity and its added cost is nullified by the fact that almost no labor is required in its application. No solution tanks are necessary and no lime sludge has to be disposed of. The only installation required for this treatment is a gas pressure regulator with pressure gauges on either side of the regulator. The gas then passes through a series of hard rubber orifices and is absorbed in the flowing water. The only labor required is about 5 min. work to connect up a new 100-lb. tank once in 6 hours in the case of the Cleveland supply."

Referring to typhoid fever in Cleveland the author makes the following remarks:

"In regard to typhoid fever since the new 4-mile intake was installed in 1904 the death rates have been low. The year immediately following the installation of the new intake the typhoid death rate dropped from 48 to 15 per 100,000 and has averaged 16 for the 7 years that this intake has been in use. In spite of the low death rate there have been occasional times when for short periods the water appeared to be the source of slight infection and this infection occurred always in the early part of the year. It was to stamp out this source of risk that the sterilization of the supply was adopted."

Grass and Weeds.

Many health officers have a good deal of trouble in dealing with grass and weeds which are allowed to grow on vacant lots, etc. We quote the *Daily Picayune* of New Orleans with regard to a legal opinion recently given in that city:

"Attorney B. T. Waldo yesterday sent the following opinion to Dr. O. Dowling, president of the State Board of Health:

" 'Referring to your recent inquiry relative to grass, weeds, etc., growing upon vacant property, streets and sidewalks in municipalities, I desire to say that I have considered the matter from every viewpoint, and that it is my opinion that the State Board of Health has, under Act 192 of 1898, as amended under Act 92 of 1906; under Act 126 of 1912, which is effective Aug. 8, 1912; under the acts anterior to 1898 and dealing with the powers of the State Board of Health, and under the general jurisprudence upon the subject matter, the authority and power to order the removal of these growths either by the municipalities or by private owners of such vacant property.

" 'I understand, of course, that these growths are deleterious to the public health and that they are prone to harbor disease, or disease-breeding insects, and that their removal is in the line of sanitation—a hygienic necessity. Such being the case, there is, I find upon investigation, no distinction whatever between maintaining or permitting a nuisance of this character and any other.

" 'I might add that I have ascertained that many of the muincipalities in Louisiana have ordinances covering this subject matter; there is no reason, should you so desire, why the State Board of Health could not proceed under these ordinances, if convenient. In any event, it is my belief, the State Board of Health may proceed in the premises independent of municipal ordinances, if preferable to the Board.' "

A Clearing House for Milk Supplies.

"A central clearing house for all the milk supplies of Royal Leamington Spa is suggested by Dr. Edward Burnet in his latest report to the town council. 'It would be a very inexpensive matter,' he writes, 'to arrange for a central office, where the churns could be screened and the individual supplies rapidly tested. If the chief suppliers would co-operate with a view to distribution from such a centre, the milk could be handed on to the retailer in suitable bottles, each bearing a municipal seal. The smaller dealers would in time be compelled to fall in; and the present abominable system of emptying the milk on the public highways, and of storing it in the customary dishes, which invite contamination from the dust and flies, to say nothing of its subsequent dilution with water or skim, would be a thing of the past. I have discussed the idea with some of our prominent producers, and have been assured of their cordial support. We only require encouragement from those whom the innovation will benefit most. Whatever the public asks for it will attain. I trust it will join in the pure milk crusade and, by a total reformation of the conditions concerned in the supply of this indispensable article of food, add another to the many attractions of this borough.' "

The Medical Officer, July 6, 1912.

Jingles on Street Cans.

Painted jingles on street cans for holding refuse were tried with success by the women's club of a small Florida town not long ago. The cans were decorated with bright colors and placed conspicuously near the curb, where fruit eaters and careless newspaper readers might be tempted to throw away skins and waste paper. The jingles were so bright and extended such a cordial invitation to everybody to fill the refuse cans that it looked as though the clean-street problem had at last been successfully solved, so far as carelessness with waste material is concerned. For the benefit of other civic workers the ingenious club members sent out copies of some of their magic jingles, one of which runs:

My name is Empty Barrel;
I'm hungry for a meal,
Pray fill me full, kind stranger,
With trash and orange peel.
Washington Post, August 9, 1912.

As Others See Us.

"There appears in the June number of the *American Journal of Public Health* an interesting report from the pen of the secretary of the American Health Association in which that officer points out in plain language why, in his opinion, the Association does not occupy the place it should in public esteem and public affairs in the several nations it represents. He asserts that one of the most potent defects in the existing scheme of the organization lies in the fact that as a more or less efficient machine the Association exists for but a few days each year. The rest of the twelve months it is, so to speak, a mere paper organization. While agreeing in the main with the secretary, we would remind him that such a result is almost inevitable where an area so large as that covered by the American Association is concerned. But we do not think he does full justice to the admirable editing of the journal of the Association—the *American Journal of Public Health*—in which there is collected in a careful and judicious manner an account of what is taking place in the public health world generally.

"Other criticisms of the secretary should, however, receive serious consideration at the hands of the executive committee. For instance, the possibility of electing members only at the annual meeting in whatever portion of the vast American continent that meeting may be held, is an arrangement which is so palpably absurd that it should be amended without further delay, and elections should be arranged for at much shorter intervals.

"Membership of the Association has hitherto been confined to those who have been for a period of three years in the active professional practice of technical branches of public hygiene, or have been for three years on the executive or technical staffs of government departments dealing with phases of public hygiene in the countries represented in the Association. There are also associate members who have qualified under certain specified provisions, foreign members recommended by the advisory council, and delegate members. The regulations covering membership of the Association have already had the effect of keeping out of the Association many persons engaged in public health work who would not only benefit themselves from membership, but who would strengthen the Association and add considerably to its usefulness.

"The centralization of administration, with an adequately paid chief executive officer, is also essential to the successful working of the Association, for which there should be a great future. Indeed, it should contain within its ranks a sufficient number of men of eminence to enable it to give definite advice on sanitary matters to all those who need it and should wield an immense influence not only on the American continent, but elsewhere. We trust the executive committee will be sufficiently far-seeing to adopt a progressive policy so that the Association may take its proper place among similar organizations."

The Medical Officer, July 20, 1912.

The United States Public Health Service.

By an act of the Congress approved August 14, 1912, the name of the Public Health and Marine-Hospital Service was changed to Public Health Service. The public-health functions and duties of the service were extended somewhat, and certain changes were made in the salaries of the officers. A copy of the act follows:

AN ACT To change the name of the Public Health and Marine-Hospital Service to the Public Health Service, to increase the pay of officers of said service, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Public Health and Marine-Hospital Service of the United States shall hereafter be known and designated as the Public Health Service, and all laws pertaining to the Public Health and Marine-Hospital Service of the United States shall hereafter apply to the Public Health Service, and all regulations now in force, made in accordance with law for the Public Health and Marine-Hospital Service of the United States shall apply to and remain in force as regulations of and for the Public Health Service until changed or rescinded. The Public Health Service may study and investigate the diseases of man and conditions influencing the propagation and spread thereof, including sanitation and sewage and the pollution either directly or indirectly of the navigable streams and lakes of the United States, and it may from time to time issue information in the form of publications for the use of the public.

Sec. 2. That beginning with the first day of October next after the passage of this act the salaries of the commissioned medical officers of the Public Health Service shall be at the following rates per annum: Surgeon General, six thousand dollars; Assistant Surgeon General, four thousand dollars; senior surgeon, of which there shall be ten in number, on active duty, three thousand five hundred dollars; surgeon, three thousand dollars; passed assistant surgeon, two thousand four hundred dollars; assistant surgeon, two thousand dollars; and the said officers, excepting the Surgeon General, shall receive an additional compensation of ten per centum of the annual salary as above set forth for each five years' service, but not to exceed in all forty per centum: *Provided*, That the total salary, including the longevity increase, shall not exceed the following rates: Assistant Surgeon General, five thousand dollars; senior surgeon, four thousand five hundred dollars; surgeon, four thousand dollars: *Provided further*, That there may be employed in the Public Health Service such help as may be provided for from time to time by Congress.

Public Health Reports, Aug. 16, 1912.

Plague and Fleas.

A recent issue of the *New York Times* contains the following interesting communication from Professor William T. Sedgwick.

"With bubonic plague knocking at our Eastern doors it is a pleasure to be able to assure the people of the United States, as you have already done, that there is no likelihood of any general or widespread trouble for us, even from the introduction of this ancient and formerly terrible disease. And this for two reasons: First, because we have, happily, at the head of our United States Public Health Service an expert of worldwide fame in this disease, Dr. Rupert Blue, who won his spurs by grappling boldly, scientifically, and successfully with the plague when it broke out a few years ago on the Pacific Coast, and, second, because this disease is transmitted by fleas, and we are not naturally a flea-bitten people.

"Bubonic plague appeared a year or two ago on the east coast of England not many miles north of London, causing much anxiety among the public health authorities and some popular alarm, but although it proved very fatal to rodents, especially rats and rabbits, it did very little harm to mankind, and was soon checked, probably because the English also are as to their persons comparatively free from fleas."

The Importance of Bovine Infection in Human Tuberculosis.

"In the *Revue d'Hygiene, 20th Arril, 1912 Vol. 34. No. 4.*, three important papers are contributed by Professor Calmette of Lille. A summary may be given of the first of these, read before the International Conference on Tuberculosis, held at Rome during last April. In this paper Calmette discusses the relative importance of human and of bovine infection in human tuberculosis. After a short summary of the history of the subject, and a reference to the differences between the two strains of bacillus as regards their morphological and cultural characters, and their virulence towards test in animals, the author notes the recent work of Weber, Theobald Smith, Park, Hess and of the British Royal Commission, and shows that the bovine bacillus, at any rate when received in repeated and large doses, is capable of infecting young children. Thus Park finds that 26.5 per cent of all fatal cases of tuberculosis at ages

0–5 years are due to infection by bacilli of the bovine type, as shown by the morphology of the organism isolated and its virulence towards the rabbit. Above 16 years, on the other hand, the corresponding proportion is not more than 1.3 per cent, while in the case of pulmonary tuberculosis the human type of tubercle bacillus is found almost without exception.

"Calmette points out, however, that the researches of Weber and of Hess show that, for infection to occur even in early childhood, frequently repeated and massive dosage with bacilli of the bovine type is required. 'Now, this condition is but seldom fulfilled, so that the danger of infecting man through the milk of tuberculous cows must be admitted to be much slighter than has of late seemed probable to hygienists and bacteriologists.' The paper concludes with a statement which may be rendered as follows: 'The chief danger to man, whether in childhood or in adult life, occurs when there is intimate association with patients suffering from open tuberculosis. For these most undoubtedly afford a repeated and often massive infection, which even the most resistant constitutions are powerless to withstand.' "

Public Health, Vol. XXV, No. 10.

Combating Infant Mortality.

Persons directly interested in this important topic will find an article by Doctor Abraham Jacobi in the *Journal of the American Medical Association for June 8th, 1912*, well worth reading. The title of Doctor Jacobi's paper, which constituted his presidential address for the American Medical Association at Atlantic City this year, is, "The Best Means of Combating Infant Mortality." The paper is rich in personal experience and wide knowledge, and is written in a stimulating, suggestive style.

Doctor Jacobi concludes as follows:—

"Now, my friends, you have been kind to me and patient, as hundreds of times before. That is why I shall now finish in a minute with a few conclusions for those who are with me are convinced that healthy women and living vigorous infants are the best possessions of this nation. They will not be conquered with treasures and cannon and corpses of countless men; they need conservation only. What I want is that a pregnant woman should be in a condition to carry her fetus to its legitimate end in health and vigor, and be able to nurse her infant. Every text book talks to us of the inability of women to do so, and indicates formulas and tradeshops and factories from which to graduate toothless young Americans. One hundred per cent of our women, however, can be made to nurse, even the 'flower and fashion' of the land. From two to three times as many babies will live when breastfed compared with the number of those whom they complacently try to raise on artificial foods. By breast-feeding you will save 100,000 babies that now die or become invalids, from no other cause but unnatural feeding.

Dangers which now attend the process of parturition for more than one-half of the women of this country must be modified, relieved or removed by the presence of a person instructed to conduct a normal labor, and, when needed, to call timely aid. We want, for the benefit of the women who need midwives, 200 midwifery schools after English or German pattern. Let no legislature of any state pass without a bill or law to safeguard the newcomers andtheir mothers.

A town without an amply supply of good doctors and midwives and a village without one or two competent and responsible and licensed midwives, are like a tenement house without a fire-escape or a *Titanic* without life boats."

VOL. II. OCTOBER 1912 No. 10

AMERICAN JOURNAL OF PUBLIC HEALTH

THE PRESIDENT'S ADDRESS

John N. Hurty, M.D.,
Indianapolis.

Read before the American Public Health Association, Washington, D. C., September 1912.

OUR ASSOCIATION, HYGIENE, BUSINESS AND GOVERNMENT.

Our association, says the constitution, has for its objects "The development and advancement of public hygiene; the correlation of principles and practice; and the promotion of public hygiene as a distinct profession." In these words a great work is declared, and it seems that probably the foremost duty we have to perform to accomplish these ends is to bring into the public mind a full appreciation of the obvious fact that prevention and not cure is the final aim of medical science.

Science has again and again shown that a very great obstacle to progress is our all too frequent inability to see the obvious.

The fact that right now our practical business men are eager to pay millions for cure, and can with difficulty be induced to spend in comparison an insignificant sum for prevention, is evidence of the correctness of this contention.

The fact is remindful too, of the sometime emphatically uttered principle —"not a cent for tribute, but millions for defense;" but, we are to observe, that in our attitude toward disease and other ills this principal is reversed, for we persistently give millions and millions of tribute to the excelsior stuffed good of cure, when a little spent for defense in the line of prevention would bring great benefits.

OUR PROGRESS.

The progress made by our association has been good; but of course must be better. Only recently we adopted a new constitution, improving the old one in not a few respects and possibly not in others. At our last meeting, steps were taken which show our motto is onward. Under laws passed in the Havana sessions, the confusion in our treasury has been removed; a full and perfect list of members and subscribers to the journal has been completed; over one hundred new members have been added to our association; over four hundred new subscribers for our journal have been secured, advertisements have been increased by 50 per cent. and at better prices, and the report of laboratory methods from our laboratory section, published at an expenditure of $700, is an asset worth fully $1600, with 400 volumes sold. The details of what is here mentioned, and the details also of other good things done, will appear in the reports of the secretary and treasurer. We certainly wrought well, when the Committee of Seven, in obedience to the resolution of the association, appointed a salaried secretary, a salaried treasurer, and a paid, experienced editor for our journal.

And how fortunate we have been in the matter of the selection of the incumbents of these positions appears more and more evident every day. Now our present needs are those which in the nature of things will *always* be with us in some degree, and to secure them our endeavors must be unceasing. We must have more members to bring in more money, more workers, more brains. Striving for these will certainly secure them in deserved measure in due time.

Our name is the American Public Health Association. Certainly a goodly name. Our objects have been stated in the words of our constitution. Our character and standing are established. We have passed adolescence. Like all other associations, we have seized upon many opportunities and neglected or missed some. We have undoubtedly done those things we ought not have done and we have left undone those things we ought to have done, and there is still much health in us.

That health will manifest itself eventually by our more completely fulfilling our prominent function as an effective leader in the public health movement.

We have heretofore lacked executive force; we need a permanent executive office to insure continuous action between meetings. As has been well said—"the working organization of the association at present is too loosely made up and too cheaply run to be effective." And then too says the same critic—"A potent defect in the existing scheme of organization lies in the fact that as a more or less efficient machine, the association exists for but a few days each year." At our last meeting action was taken toward the removal of some defects. It is now possible to elect members between meetings, and not only for five days in the year. This change has led to a decided increase in membership of the permanent kind. Under the old system, every year the membership was recruited from the region where we met, but the majority of the recruits joined for a year only, the association was stimulated by the membership fee received, then the new ones dropped out, the process was repeated, and still we languished for lack of members of a kind that work.

I believe we should not longer delay opening wider the entrance door and above place the motto—"Welcome to all who believe." To be a useful active member of our association, it is surely not desirable as the constitution says, to "have been, for a period of three years, in the active professional practice of technical branches of public hygiene; or have been for a period of three years on the executive or technical staffs of governmental departments dealing with phases of public hygiene in the countries represented in this Association." Such requirements should not stand against active membership, but would be proper for membership of sections.

A man who is high in power and position, whose name is known in every household, expressed a wish to belong to an association devoted to raising the public health. This wish was expressed when he had been told of the aims and practical work of our Association. He is a man who wishes to work, to bear his share of the burdens and honors, to vote, and to have free speech upon all and every question. He therefore did not want to be an honorary, or an associate; he desired to be an active member. Our constitution barred him, and his name does not therefore give luster or eclat to our roster. I would say, let any person of good character, who is interested in hygiene, who will pay his annual dues and will attend, be an active member.

I suggest that we simplify markedly the constitution and by-laws in such a way as to admit all who believe.

I would abolish the class of associate members, I would cut out all the hopeless red tape which now surrounds, and sometimes blocks, even the simplest business operation of the association. I would establish a permanent salaried executive secretary. His office would be a clearing house of information on all public health questions, and through this means we could take up definite and practical constructive work.

The obstructive features of our constitution and by-laws could be eliminated speedily, but the building up process upon a right foundation must, perforce, be slow. I do not advocate that we go at this matter with an axe, but on the contrary that it be done carefully and judiciously but with all convenient speed. As a vital first step in the direction of increasing usefulness and influence, of meeting the most important need of the situation, I regard the Journal as the essential factor. It is our orator. The enemies of Greece said, "Give over Demosthenes into our hands and we will cease our warfare against you." But the Greeks kept their orator and kept on fighting and the already great nation became greater. Let us make the Journal great by making it possible to do a great work, and then the parent will see the rapid development and advancement of public hygiene, the correlation of principals and practice, and the promotion of public hygiene as a distinct profession. But enough of this; and now health, more health, is the slogan.

WHAT IS HEALTH?

This is the title a minister suggested to a hygienist whom he invited to occupy his pulpit. It is a big text. An authoritative definition might be productive of good to the public health cause. Perhaps careful examination would disclose that it would be wise for this association to formulate a definition and give it to the lay press. I think it would be gladly received and widely published. It would make clear a matter that is now hazy even in some minds which have dabbled more or less in hygiene. We all have read Dr. Crumbine's definition, which is excellent indeed, and I dare present it because of its excellence and because its review may lead to the adoption of my suggestion.

"Health" he says, "is a state of physical, mental and moral equilibrium—a normal functionating of body, mind and soul. It is the state when work is a pleasure, when the world looks good and beautiful, and the battle of life seems worth while. Health is the antithesis of disease, degeneracy, and crime.

"The laws of health are as inexorable as the law of gravitation, as exacting as eternal justice, as relentless as fate, and their violation is the beginning and cause of all disease, suffering, and sin.

"Health is the most desired of earthly blessings. When finally lost it cannot be purchased by uncounted millions, restored by the alienist, or returned by the pulpit.

"Health is that state of happiness, faith and love whose prototype was the first man—Adam; whose ideal is the Christ."

This is a splendid sermon, and it contains suggestions for several good sermons on health. I wish our association would adopt this, if consent can be gained, or formulate another, and send it forth to the world. It would comport fully with our dignity and the objects of our being, and would start something in the line of "the development and advancement of public hygiene."

WHAT IS HYGIENE?

Hygiene is a great science. It deals with the attainment and preservation of health. Solomon was asked "What shall I give thee,"—and he chose wisdom. But not enough of the gift was bestowed to enable him to preserve his health, as is evidenced by his many pessimistic lucubrations. He might well have asked for a healthy mind in a healthy body and a knowledge of hygiene sufficient to preserve both, and this would have been widsom.

Hygiene has in it the promise of more good for both individuals and the human race than any other science. Its first great idea is—let us not be sick, for disease is ignorance and health is normal, It must answer the questions—from whence comes sickness and disease? And this it has done to a good degree. Second, it must answer—what is necessary to prevent sickness and disease? And this too it has done to a good degree.

The foolish, weak idea that unwellness and disease are devils or evil entities which somehow find entrance into our bodies prevails, even now, to not an inconsiderable degree. And, marvelous to relate, there arose only yesterday a cult which says there is no sickness, no disease, no pain. This declaration is made too in the presence of plainly apparent physical pain and suffering and even in the presence of a case of severe loathesome smallpox, thus discovering that the said cult is in pitiable and hopeless estrangement from common sense. And again it proves that the mentally sick or mentally defective class is larger than was previously believed.

For centuries man has tried to turn back, or at least to control disease by cure; yet, knowing since the days of the creation of the mythologic Hygiea, that prevention was the rational course. At no period in history has this truth been more forcibly shown than in the last quarter century by the triumph of hygiene over yellow fever. In connection with that disease therapeutics bore no burden. Not a single medicine in all materia medica had the least effect. Prevention and it alone, has abolished yellow fever. And this broad application of hygiene to the masses brings wholesale health. And it should be noted that, as with typhoid fever, the prevention of one case prevents three cases of other diseases. Business has profited greatly by this triumph of hygiene over yellow fever, and government and morals and all other elements of civilization also.

That health is the basis of all wealth, power and happiness is plain to any one. That business and government has for so long neglected to place hygiene in the front of all practical agencies for good, simply declares that those in charge of business and government have not yet risen to a full understanding of the situation they are trying to control. John Fiske remarked, "It takes a thousand years to raise the human family a single notch." In view of the tardiness of business men and of those in control of government to grasp the business and governmental importance of hygiene, it would seem that Fiske much underestimates the time. Münsterburg said, "Hygiene can prevent more crime than any law." Disraeli, the practical statesman and empire builder, said, "The care of the public health is the first duty of the statesman." A bill for a law intended to make practical the government's part in the care of the public health, provided as follows: "It shall be the duty of the bureau of health to collect and disseminate information relating to the public health."

This was pronounced to be a deadly provision by an orator in the Senate of the United States. He said, "This would be planting the seeds of disease and killing more innocent and unsuspecting people than drugs ever saved." Think of it; this in the United States Senate in the 20th century and by a man who can read and write, saying that disseminating *information* concerning the public health would be planting the *seeds* of disease. This is calculated to make one despair of our nation ever being able to take kindly care of all of its defectives.

Not until the science of medicine had purged from the human mind the idea that insanity was possession of the devil, and showed it was a physical ill, did mankind come to treat the insane in kindness, patience and charity. The kindness, charity and patience were in the great human heart all the time, but the human mind was charged with error and this stifled the heart's expression. Obviously, we must rise out of the patent medicine stage of ignorance and out of any so-called religious beliefs which are "loaded with a perishable freight of over-ripe theology," before hygiene can do its beneficent work for mankind.

HYGIENE AND BUSINESS.

Sickness, ill health, disease, weakness and early death cannot build up business. It probably would not be amiss to say that if not a majority, certainly a good proportion of business failures are due to ill health or disease, unnecessarily, yes, foolishly acquired. "I am sick to-day and unfit for business" said the manager of a large business concern. Another said "I notice I am very liable to make mistakes in my business when I have a cold or a headache or have even a slight indigestion." Plainly, when a man suffers from typhoid fever or pneumonia or syphilis, he is absolutely unfit for business or indeed any of the affairs of life. He is then a charge, a burden, and a threat against business, against his family, his friends, and the state. A science which would prevent communicable diseases, and which can teach how not to have the minor ills (which in the aggregate do more harm than infectious diseases) is of great business importance, and such a science is hygiene. When an epidemic of smallpox or diphtheria appears in a community, business is hurt, and the business man demands that the health officer shall put it out. The business man formerly thought the way to get rid of epidemics was to deny their existence or to stifle all information of them, thus showing they believed ignorance to be a force for good, and this too, when ignorance is the only sin. But now he has emerged somewhat from this ignorance, and appreciates to a greater degree how hygiene can help business. There is no money in sickness except for the doctor and druggist, and they frequently spend all they can make from sickness in seeking cure for their own sickness. Three quarters of a century ago Horace Mann the well-known educator, when told one morning he did not look well, said, "Yes I am ashamed to say I am not well." We did not know then as fully as now, the causes and needlessness of sickness, but Professor Mann had grasped the central idea of the science of hygiene.

If an archangel, with credentials to prove his power, were to come to Washington, and during a lull in the political hubbub were to tell us that for $100,000,000 he would *cure* all the diseases and would leave the medicine or its formula to cure them as fast as they appeared after he was gone, we would raise the $100,000,000 in no time. Congress, all state legislatures, boards of trade, commercial clubs, bankers' organizations, would all tremble with activity in their eagerness to produce the hundred millions. And what a funny sight it would be! Then the regulars, and the irregulars, and the quacks, and the mind curers, and the faith curers, and the advocates of all pathies, of all cults, and the business men, ministers, teachers, one and all, would view this proposition as a practical one, and in spite of the fact that it is contrary to the fundamental principles governing the situation. Now, right in the front of us and always present stands an archangel fully credentialed, who is ready to teach us how to drive ill health, disease, imbecility, insanity, crime and pauperism from the earth. His name is *Hygiene*. He does not ask $100,000,000 for his discovery, he will give it to us. And yet, in the presence of this heavenly offer we stand stupid, like pigs before pearls. The proposition of the archangel Hygiene is rational, accords with nature's laws, and is the biggest and most practical business proposition before the world today.

To hope to overcome disease by cure is simply ridiculous. To try to sweep back the sea would be a more hopeful task. That prevention is practical, rational, business-like, scientific, is plain even to a child, yet we continue to depend upon the irrational, impractical, unbusiness-like, unscientific idea of cure to relieve the world of sickness.

HEALTH AND HEREDITY.

Race hygiene precedes individual hygiene in classification and in importance. Nation hygiene, as when a nation rises and puts out yellow fever, also precedes individual, that is, personal hygiene.

Race hygiene is primarily concerned with the great subject of heredity. Researches in heredity have let into many human problems a flood of light which was not enjoyed by those living in the first half of the last century. A strong thinker guided by this light said, "At the moment of conception the gate of gifts is closed." In fact, it is closed long before. It is personality which arises when the ovum and sperm cells blend together.

One servant may inherit one talent, another two and still another three, four or five. But these talents were given them; talents are not acquired. The person who is given but one talent will invariably hide it in a napkin and it will be taken away altogether, while he who is given several, places them at usury and they produce a hundredfold. And so it is—all that a person may be, his entire physical and mental potencies, come with him from the womb.

> "His life was gentle; and the *elements*
> So mixed in him that Nature might stand up,
> And say to all the world, *This was a man.*"

Our only privilege is to develop the heritage we have received, the elements transmitted from our parents, and this is our life long task.

"Recent studies in heredity" says Davenport "make it probable that every *disease*, every peculiarity of form, structure and conduct of human beings, is determined in part by an hereditary factor." Continuing he says: "The nervous history of every child is thus, within limits, predetermined at the moment of conception. From this point of view the germ plasm carried by the parents becomes of increased importance. The family physician, after becoming cognizant of a contemplated marriage which must lead to nervous and weak offspring, should take steps to prevent its consummation. If the rules of professional secrecy regarding matters of importance to progeny work against social progress, they are in so far immoral. The physician must take an active part in race hygiene, or he may be replaced in this capacity by the rise of a new profession."

In the act entitled, "In the Land of the Unborn," in the play of "The Blue Bird," Maeterlinck, in the manner of a genius, shows he has given thought to the great subject of heredity. In this act the curtain rises on a stage well filled with little children, covered with filmy white veils from their heads to their naked knees. In the distance is the sea of time with the rock of ages in the foreground. A white barge appears bearing Father Time with flowing white hair and beard and scythe. The barge touches the rock and Father Time steps out, and the unborn rush to meet him supplicating to be born. He is Time, he bears no bowels of compassion, and he gives not the slightest ear to the cry of the souls before him; he utterly ignores their pleas and supplications. "Ha! you all wish to be born," he says. All rush toward him with uplifted hands and pleading mien. All carry small baskets. He waves back the first two. "No, not you; you must wait ten years." They fall back. Two others present themselves. "Yes," he says, "its your turn, get in the barge." Now two others come forward. He eyes them severely and says, "Yes, it is your turn too; but hold"! (he looks in their baskets and asks) "have you there the diseases you are to suffer from?" They nod their answer and he passes them on.

It is further noted that Father Time makes no requests; he moves with brutal air and he commands. He looks over the heads of those near to him and pointing to a little boy says, "You come; you are an engineer, mankind needs you." No others are called for.

Undoubtedly there are those who will say, Davenport and Maeterlinck have gone too far, they are extreme. Be that as it may, it is still true. Time goes relentlessly on, generations appear and disappear. Chinese continue to be born of Chinese, negroes of negroes; figs do not come from thistles; blue eyed individuals are born of blue eyed parents; those who break easily under the ordinary strain and stress of life are from a line of ancestors like them, and those who reach old age without serious sickness and without disease and retain their faculties, have in them the blood of those of like accomplishment.

A mere child for the first time saw his new born sister. "What's that? he sharply asked. "It's your new born little sister" was the reply. "It looks like it" remarked the youngster and ran away to play. Whether or not it is true that "*every disease* is determined in part by an hereditary factor" I do not positively know, but I can say,—it looks like it.

THE MICROBE AND HEREDITY.

For three decades the microbe has held the center of the hygienic stage. The transmissible diseases have been wholly accounted for by and through it; but now a new science appears called eugenics, and it declares that not only every peculiarity of form, structure and conduct are determined in part by heredity, but *every disease* as well. However, this in no degree combats or contra-indicates the work of disease prevention, for no matter what the susceptibility may be, external causes have their effect, Besides, if a susceptibility to certain diseases is inherited, then those who bear it in their germ plasm should not become parents if disease is to be abolished.

Our free public school system is based upon the idea that education (nurture) is the greatest controlling force in life. "*We must educate, we must educate, or we perish,*" was the refrain of the orators, and they were right. Yet, it seemed at that time not realized that we educate because we have evolved to a plane where we demand education. We did not then know that acquired characters are not transmitted, and that the reproductive cells are, in a sense, parasitic to our bodies, and quite unaffected by external influences. We had long been told that no one by taking thought could add to his stature, but we had not grasped its full import, for we firmly held that education would drive hence quite all of society's ills. By it we expected to mend defective minds, not knowing that minds and their possibilities, like hearts and their possibilities, are determined at conception. Now we know where the trouble lies with defaulting cashiers, who are not lacking in education and moral training, some of them having been teachers of morals and religion, figuring prominently as Sunday school workers.

They are born defectives, having inherited a defective moral nature.

They have proceeded from a line tainted with the same defect. They did not inherit moral stamina sufficient to enable them to withstand the temptations before which they fell. Powerful and fierce indeed is that environment which can make a thief out of a man of moral inheritance. When needing sorely the bare necessities of life, when feeling the biting pangs of hunger, Lincoln did not falter in choosing the course of honesty. And we cannot conceive it possible for such a character to steal money to gratify the desire to splurge in society. Surely it is the boon of boons to be well born.

WHERE HEREDITY BEGINS.

It is true that whatever is inherited, be it good or bad, mental, moral or physical, has its beginning at some definite arbitrary time. This is when conception occurs, for then, as has been said, the "gate of gifts is closed."

Chromatin is the one constituent contributed in probably equal quantity by both parents, and being constrained to accept this as fact, then there may be, equally and interchangeably, inheritance of features peculiar to either parental stock. We are also constrained to conclude that the qualities inherited are contained in and carried by the nuclear material we call chromatin.

Infectious diseases are caused by the invasion of pathogenic organisms, but many considerations force the conclusions they cannot and do not invade the germ plasm; and even if they could and did and their particular disease produced in the child, still that disease could not be said to have been inherited, for the disease germ in such instance would not be a part of but would be a parasite upon the germ plasm. True, the result is the same whether or not this is inheritance; but the distinction is true, and it is an understanding of the truth that we must have.

In studying this matter we recognize first, the parental properties transmitted to offspring, and this includes all forebears for all generations; and second, we recognize certain attributes which may be ascribed to the bio-chemical interaction of the two parental germ plasms. That such action exists seems most reasonable, for otherwise, what prevents all the offspring of the same parents from being identical in all physical, mental and moral attributes?

WHAT IS INHERITED?

It is of common observation that some families are susceptible to certain infections. This is especially observed in connection with tuberculosis. Every one experienced in the treatment of this disease knows that in certain patients, even in the true incipiency of the attack, all efforts fail to check the progress of the processes. Opposing this state we find families which show marked immunity against certain or all infectious diseases. Even in the same family the different individuals not infrequently show a marked difference in susceptibility. An immunity against disease in certain animal stocks has long been observed. A farmer in Indiana with much pride showed me an enormous boar. "There is no runt in the litters sired by that animal," he said; "and further, his pigs don't get sick." "You believe in breeding strong stock?" I said. "I certainly do," he replied, "for what is the use in having animals which even under good conditions won't grow as we want them to and are forever getting sick and dying?"

It is well known that Hereford cattle are rarely affected with tuberculosis, while the Jerseys are exceedingly liable to it. This has been explained upon the ground that the first named breed is more recently from the ranges, where pure air, "the enemy of consumption," is most abundant. That the Jerseys have long been confined in houses and thus subjected to bad air with its consequent ill effects. This is not satisfactory. It would not, for a moment, be offered as an explanation of those physical features by which we know the Herefords from the Jerseys, nor in explanation of the marked differences which exist in milk and butter producing capacity.

Obviously, heredity is the force which produces these differences and it also produces the greater resistance to the tubercle germ which the Hereford stock enjoys. The frog inherits a blood plasma that is inimical to the anthrax bacillus and the cholera vibrio. The first known blood resistance to disease was that of the fowl to anthrax. It has been shown that it is difficult indeed to overpower a fowl with anthrax bacilli and produce the disease. The pigeon is of special interest in this argument because of its inherited immunity to the bacillus of human tuberculosis; but while it successfully resists this disease, it does not resist all diseases. I believe it is possible to present an overwhelming mass of experimental evidence to show that a truly healthy organism is endowed with blood cells which are able to attack and destroy very large numbers of intruding microbes.

Laboratory investigations with living animals show conclusively that the blood cell of the healthy non-impressionable subject, attacks, absorbs, and digests tubercle bacilli with energy and dispatch. On the other hand, the blood cells of certain individuals, and even of all of the individuals of certain varieties, do not have the power of destroying tubercle bacilli; and then, no matter what the medicine or food or other external influence, off goes the subject with tuberculosis. The prevention of disease in such an individual, like the making of Dr. Holmes' gentleman, must be begun by selecting proper ancestors. To protect absolutely from pathogenic germs would, of course, prevent the development of their respective maladies; but to do this is hopeless. To do it in part is practicable, and we must push the work to the limit, but hygiene must do more. Eugenics as a science must be studied and applied by hygiene in its great and good work of disease prevention. Heredity is a force which hygiene must employ.

Dr. Hill in his excellent series of articles entitled, "The New Public Health," says: "The old public health was concerned with the individual. The old showed the sources of infection in the surroundings of man; the new finds them in man himself." Dr. Hill's reference is to the infections which are found in man himself; that is, man himself cultivates and carries and transmits among the members of his race the disease infections. A true and wise utterance indeed, but not the last word.

A statistical investigation of certain eye diseases, especially myopia of a high grade, has shown that the first born children of families hereditarily affected are much more liable to have eye defects than later children. The consanguinity of the parents is also shown to be a predisposing factor. Further, statistics show that myopia is more frequently transmitted by the mother than by the father. Female children are more apt to inherit myopic defects than male children, while the males show a greater tendency to the inheritance of other eye lesions.

Recently Professor Karl Pearson gave a curious instance of the inheritance of cataract. He reported records of a woman who suffered from cataract of the eye and who had now living thirty-nine decendants, all of whom were sufferers from cataract.

Certain it is that a disposition to tuberculosis may be inherited. From the parents may descend tissues which actually offer an hospitable soil to tubercle organisms. Again, resistant tissues or cells may be inherited which present an inhospitable soil.

For soldiers, men are selected who are not simply physically strong but who have not suffered from sickness and whose parents have had a fair freedom from sickness. Very common observation discovers that short lived lines of stock exist. Generally a long lived person has long lived ancestors. The insurance companies make practical business use of all of these and of many other like facts.

Research by Tyzzer, Mayit and Haaland in Norway and the collective inquiries in Germany and Holland all confirm the influence of heredity in cancer; and it has been suggested that probably no one can have cancer who has not inherited the peculiar or weak cells capable of being affected. We know that all sorts of physical, mental and moral defects are transmitted with fatal precision. We do not inherit strength; that is the result of nurture; we inherit the ability to acquire strength, that something which may be developed into strength.

If this is accepted, then failure to be born with the trait which makes possible the acquirement of strength, means weakness, which no amount of nurture can overcome. Weakness means openness to the invasion of infections. It is true, no matter how strong the tissues may be, nor how capable the cells may be to produce antibodies, they cannot withstand an overcharge of infection. Therefore, both strong and weak may have germs caused diseases, but those who have inherited resistent tissues or a strong power to produce antibodies, have the most desirable inheritance.

Epilepsy, sick headache and certain insanities are certainly hereditary diseases. These are really unbalanced or defective states of nerve composition which never can be trained or doctored to normal vigor or resistance.

Surely we must go back of the microbe to find the true reason for disease, or should I say—to find the conditions which permit ordinary acquisition of disease. For it seems true that from the force we call heredity is derived the blood cell in the non-impressionable subject which enables him to withstand physical strains and the onslaughts of large numbers of disease organisms.

It has been said "we are the plaything of the forces of nature," and so we are if by this is meant we are governed by inexorable law.

And the lesson we are to first learn is—that we must know the law and obey it. This understanding will indeed finally enable us not only to realize and fulfill the grand inspired message of Pasteur—"It is possible to drive all parasitic diseases from the earth," but also, that all diseases and all defects of body and mind may be controlled in great degree.

PERMISSIBLE LIMITS OF SEWAGE POLLUTION.

A SYMPOSIUM OF EXPERT OPINION RELATING TO NEW YORK HARBOR.

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Starting with the fact that the water of which sewage is chiefly composed must eventually be discharged into some natural body of water and recognizing that it is usually impracticable to remove all the impurities beforehand, the question arises—To what extent must the sewage be purified?

In arriving at an understanding of this subject, many general statements can be made, but upon attempting to apply them to any particular case, it will often be found that they are lacking in that definiteness and suitability which is necessary in order that they shall have practical value. So much depends upon the uses to which the natural body of water is put after the sewage is discharged into it that hard and fast requirements are difficult to lay down. In some cases the most complete purification which it is possible to give will not be too much, while in others it will be permissible to discharge the sewage in practically crude condition. Each situation requires to be considered separately.

An instance in which the need of careful study of the local conditions was clearly recognized and a situation of more than ordinary importance from various standpoints recently arose in connection with the work of the Metropolitan Sewerage Commission of New York, which is a board of engineers created to make plans for the protection of New York harbor against excessive contamination by sewage. The commission has recently drafted a report in which the permissible limit of pollution for the harbor is fully dealt with and a definite standard of cleanness for the water proposed. In addition to the conclusions of the board, the report contains a number of opinions of sanitary experts who were engaged by the commission to express their individual views as to the desirability of establishing a standard of cleanness for the harbor and of the provisions which such a standard should contain. Following is a statement of the qualifications of the experts, the questions which were submitted to them and a synopsis of their replies.

THE EXPERTS.

The experts were selected from the professions of engineering, chemistry, biology and sanitary science. Each was given a list of questions to which he was asked to make written reply. The experts were afforded facilities for inspecting the harbor in order to become personally acquainted with the conditions created by the present method of disposing of the sewage and with the uses to which the harbor waters were put, and were furnished with the printed reports of the commission. There were eight experts; their qualifications were briefly as follows:

A foreign chemist: an eminent authority on the chemistry of sewage-polluted tidal waters and a contributor to the Fifth Report of the Royal Commission on Sewage Disposal of Great Britain.

An epidemiologist: noted as an author and authority on the transmission of communicable diseases.

A sanitary engineer of wide practical experience in the design, construction and management of sewerage and sewage disposal works.

A civil engineer, Past-President of the American Society of Civil Engineers and of much experience in sanitary work.

An American chemist: professor of chemistry in a prominent technical school and author of various books on sanitary subjects.

A hygienist: professor in a well known technical school, author and prominent sanitarian.

A health officer and chief engineer of one of the most progressive state departments of health in America.

A biologist, experienced in sanitary investigations particularly with reference to the purification of sewage.

THE QUESTIONS.

The questions follow:

1. Do you think it would be desirable and feasible to establish a standard of cleanness for the waters of New York harbor?

2. If a standard is established, should it be based solely on chemical analyses or would a mixed standard which would take into consideration the appearance of the water and perhaps its physical, chemical and bacterial condition be better?

3. Should a standard of cleanness rest upon the amount of sickness and death which can be shown to be produced by pollution or should the standard be based on what seems suitable and appropriate on the score of cleanness?

4. Should the waters be kept pure enough for bathing and, if so, where?

5. Should the waters be kept pure enough for oyster culture and, if so, in what parts of the harbor?

6. Should effervescence, marked discoloration, decided turbidity, oily sleek, floating solid sewage materials or deposits of sludge be permitted anywhere in the harbor and, if so, where and under what circumstances?

7. Should we establish one standard of cleanness for the whole harbor or should there be different standards for different parts of the metropolitan district?

8. If a definite standard of cleanness is desirable, how should that standard be expressed? Please give us a draft of your opinion as to the proper wording?

9. "Will the amount of dissolved oxygen in the waters of the harbor, expressed in a per-

centage of its saturation value, furnish a reliable index of the cleanness of the water and, if so, what percentage should be adopted to secure each of the following results:

(a) That the waters of the harbor may not become offensive under any weather conditions.
(b) That the use of public baths, if judiciously located, may not be prejudicial to the health of those using them.
(c) That shellfish taken from the beds in present use may be eaten without danger to health.

If the percentage of dissolved oxygen will not furnish a satisfactory standard, what standard would you suggest, and should it be based upon chemical analysis, or should it take into account chemical, physical and bacterial conditions?"

THE REPLIES TO THE QUESTIONS.

All the experts considered that provisional standards of cleanness for the harbor should be established. Some favored one standard; some another. In no case was a standard proposed solely in terms of chemical or biological analysis.

All laid emphasis upon the appearance of the water and insisted that the standard of cleanness should be so framed as to provide that the water should look clean. All were of opinion that the standard of cleanness should not rest solely upon the effect of the harbor water upon the health of the people who lived in the nearby cities, or passed over the waters in ships, or worked upon docks and piers, or sought recreation in the parks on shores.

So far as sickness was concerned, it was the epidemiologist's opinion that the present condition of the harbor was not a serious menace to health; but he thought this no reason why sewage should be permitted to defile the water. Strong reasons existed for keeping the harbor clean. There was a public demand for clean highways and clean waterways as well. To the occasional visitor to New York, it appeared that the limit of permissible pollution of its waterways had been reached. The waters were evidently heavily polluted with sewage.

The American chemist considered that the amount of disease and death directly produced would not be a proper measure of the objectionable nature of the harbor's condition. Conditions which offended the senses, and the existence of which conditions he saw abundant evidence, should also be taken carefully into account, for such conditions indirectly lead to disease.

The civil engineer pointed out that while many lives probably could be saved and much ill health alleviated by reducing the pollution, it was still more important to consider the question of a clean harbor from the standpoint of what was suitable and appropriate on the score of cleanness. It was a case where civilization demanded a remedy on the score of what was necessary for the comfort, happiness and welfare of the public.

BATHING AND SHELLFISH.

There was a preponderance of opinion among the experts that it would not be practicable to keep the waters of the inner harbor clean enough to make bathing entirely safe, but it was held to be both feasible and desirable to maintain bathing places near the sea, and within easy reach by the public, in satisfactory condition. Because some bathing was likely to occur in the populous parts of the harbor in spite of any restrictions which might be made, and because the shores were certain to be crowded with human beings engaged in gainful occupations or seeking the water-front for relaxation and fresh air, the hygienist and others thought the water along the shores ought to be kept as clean as practicable.

In the opinion of the sanitary engineer, it seemed probable that if the open waters of the harbor were kept as clean as the requirements of business, pleasure and recreation demanded, there would be little danger to the public health, provided bathing and the taking of shellfish for food were restricted or prohibited. The foreign chemist did not think there was great danger in bathing, provided analyses showed that the water contained plenty of oxygen, was comparatively free from ammonia and there was absence of visible sewage matters. The epidemiologist did not consider that there was great danger of sickness from bathing in polluted water unless the sewage was discharged close to the bathing places. On the other hand, the sanitary engineer found it impossible to avoid the conclusion that considerable sickness was produced by bathing in the polluted water of New York harbor.

All thought it unnecessary that the waters of the inner harbor should be kept pure enough to make bathing perfectly safe, if suitable bathing places, such as Coney Island and Rockaway, could be maintained in satisfactory condition. The hygienist would have such bathing places as Coney Island kept in scrupulously clean condition. The civil engineer did not think it practicable to make bathing in the waters of the inner harbor entirely safe against disease, and regarded this as an unreasonably high standard of cleanness to seek to maintain. The American chemist considered that it would not be possible to keep the water in any part of upper New York bay clean enough for bathing and thought that bathing establishments on the water-front of Manhattan and Brooklyn were a menace to public health. The very presence of these places, he pointed out, was a guarantee by the City authorities of the safe character of the water. The biologist expressed the opinion that the waters of the inner harbor should be abandoned for bathing and shellfish culture. The waters of the Lower bay could, he thought, be kept clean enough for bathing and the cultivation of shellfish and should be maintained in that condition.

All the experts considered it impracticable to keep the waters in the inner part of New York harbor pure enough for oyster culture, but, with care, it seemed to some to be possible adequately to protect the oyster grounds near the sea. The value of the oyster industry did not appear to the sanitary engineer to be of sufficient consequence to warrant the construction of the expensive works which would be necessary to insure to the waters of the inner harbor a sufficient degree of purity to warrant oysters being taken from them. The hygienist did not consider the oyster business to be of enough importance to warrant the expenditure of large sums of money to secure any special degree of purity for the waters. The danger of pollution from passing ships was so great as to forbid the culture of shellfish in New York harbor. The civil engineer felt that shellfish should be protected against sewage in areas which are remote from centers of human activities, if this protection could be made genuinely effectual. The health officer would not permit oysters to be cultivated anywhere within the metropolitan district except under strict supervision and control, and the biologist thought it might ultimately be necessary to sacrifice all oyster beds within the metropolitan district.

VISIBLE POLLUTION.

All the experts held the opinion that, while visible evidence of sewage was practically unavoidable near sewer outfalls, large sewage solids should not be present anywhere in the harbor except, perhaps, to a limited extent from the shipping. A small amount of oily sleek was permissible, but sludge and the escape of gases due to putrefaction should be prevented. The foreign chemist believed that sewage solids, either floating or deposited, and gas should certainly not be permitted anywhere except such as come from boats, but that some discoloration and turbidity might be allowed in the vicinity of suitably situated outfalls. The sanitary engineer considered that turbidity and discoloration might be tolerated over relatively small areas in the immediate vicinity of properly located sewer outfalls, and oily sleek be allowed, provided it consisted simply of very thin films of oil in isolated and relatively small areas. The civil engineer would not permit sewage to be visible at the points of sewage outfall or elsewhere, and thought that the sewage should be purified or discharged into deep water under circumstances which would prevent its appearance from the shores, docks and other places where it might prove offensive. The water should not be allowed to become so polluted as to be blackened. Deposits of putrefying sludge should not be permitted to occur along the docks.

In the opinion of the American chemist, the presence of oily sleek was not objectionable since he did not consider it unsightly and an infinitesimal amount of oily matter might produce it. He considered that it would be impossible to keep the water free from discoloration and turbidity, on account of the natural silt which the Hudson river carried down from the northern part of the state. Floating solid sewage material should not occur. Conditions which were disagreeable or disgusting either to the sight or smell of the average citizen using the waters for rowing, sailing or similar pleasure purposes, the hygienist thought, should not be permitted.

The health officer felt that the visible evidences of sewage were so objectionable, and already existed to such an extent, that immediate steps should be taken to construct a system of main drainage and sewage disposal. This view was also held by the epidemiologist and others. The civil engineer expressed the opinion that no time should be lost in determining upon, and beginning, this work, so that the pollution of the harbor might be reduced rather than increased, a result which he considered inevitable if wise action was not soon begun. The biologist's opinion was that occasional discoloration, turbidity and sleek could scarcely be avoided in the vicinity of a great city, but these conditions should not be permitted to become persistent or of frequent occurrence, otherwise they would constitute what he regarded as a shortsighted and uneconomic waste of one of the city's most precious assets.

DISSOLVED OXYGEN.

So far as the permissible draught upon the oxygen was concerned, there was no unanimity of opinion. All who expressed themselves upon this point considered that a deficiency of 50 per cent. indicated serious conditions. The civil engineer's idea was that the sewage should not anywhere reduce the percentage of dissolved oxygen below 50 per cent. In the neighborhood of permanent or comparatively permanent beds for the cultivation of shellfish, the standard should insure bacterial purity. In the vicinity of bathing places, the water whould not only be of a high standard bacterially, but should also be free from floating sewage, should have a large amount of dissolved oxygen and should be chemically near to the normal condition of pure salt water or water of the normal salinity due to its position. In the neighborhood of docks and thickly populated shores, it might be sufficient to provide a physical standard of purity.

The American chemist was not prepared to suggest a definite amount of oxygen as the best permissible to maintain, although he believed 70 per cent. was an unduly severe measure by which to be guided. He considered that the physical appearance of the water, more complete chemical analyses than determinations of dissolved oxygen and bacterial examinations should be included in the standard of cleanness.

For the more polluted parts of the harbor, the biologist suggested that the dissolved oxygen be at no time and at no place allowed to fall below 50 per cent. of its saturation value. No effervescence, marked discoloration, decided turbidity, oily sleek, floating solid sewage materials, deposits of sludge, or other conditions offensive to sight and smell, should be permitted in any part of the harbor. For the less polluted regions, the outer bay, for example, the standard should be primarily sanitary and should rest upon bacterial rather than chemical data.

The foreign chemist would establish a higher standard of purity than any of the experts mentioned, so far as oxygen was concerned. He would not permit the oxygen to be exhausted below 60 or 70 per cent. of saturation, at low tide under calm weather conditions and at any point within 200 yards of a point of sewage discharge, either at the surface or any depth below it. Before discharge, the sewage should be freed, as far as possible, of solid matters by means of mechanical subsidence, or, in the case of unfavorably situated outfalls which it would be difficult or impossible to remove, by chemical precipitation. In his opinion, such a requirement would insure proper protection to the harbor without undue hardship upon the taxpayers. The water beyond the neighborhood of the sewer outfalls would, in all probability, show no appreciable deficiency in dissolved oxygen, not even when the volume of sewage to be disposed of became largely increased with the increase of population.

OPINION OF THE COMMISSION AS TO THE DEGREE OF CLEANNESS SUITABLE FOR THE WATERS.

With regard to the degree of cleanness which should be maintained in the harbor waters, the commission has officially recommended the following specific requirements:

1. Garbage, offal or solid matter recognizable as of sewage origin shall not be visible in any of the harbor waters.
2. Marked discoloration or turbidity, due to sewage or trade wastes, effervescence, oily sleek, odor or deposits shall not occur except perhaps in the immediate vicinity of sewer outfalls, and then only to such an extent and in such places as may be permitted by the authority having jurisdiction over the sanitary condition of the harbor.
3. The discharge of sewage shall not materially contribute to the formation of deposits injurious to navigation.
4. Except in the immediate vicinity of docks and piers and sewer outfalls, the dissolved oxygen in the water shall not fall below 3.0 cubic centimeters per litre of water.* Near docks and piers there should always be sufficient oxygen in the water to prevent nuisance from odors.
5. The quality of the water at points suitable for bathing and oyster culture should conform substantially as to bacterial purity to a drinking water standard. It is not practicable to maintain so high a standard in any part of the harbor north of the Narrows, or in the Arthur Kill. In the Lower bay and elsewhere bathing and the taking of shellfish cannot be considered free from danger of disease within a mile of a sewer outfall.

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*With 60 per cent. of sea water and 40 per cent. of land water and at the extreme summer temperature of 80 degrees F., 3.0 cubic centimeters of oxygen per litre corresponds to 58 per cent. of saturation.

SOME ECONOMIC ASPECTS OF FACTORY HYGIENE.

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Read before the American Public Health Association, Washington, D. C. September, 1912.

Successful manufacturing is the art of making things at a profit. Because long established or exceptionally well-managed concerns pay steady dividends, manufacturing is not necessarily profitable. A manufacturer must count his costs.

The majority of manufacturers throughout the land are engaged in establishing new enterprises. They are fighting the wolf and have to figure how to avoid those small expenses, which if allowed, eat up profits, and would result in shutting down the business.

The habit of scrutinizing expense accounts sharply and continuously is the basis of existence in a manufacturing business. Therefore, in advocating an administrative policy of any kind in a factory the first question must be "Does it pay?" Even in an old established and profitable concern—in view of expensive, unavoidable and constant changes in process and methods, and the threatening pressure of alert competition,—maintenance of vitality depends upon this constant querying. "Does it pay?" must be the first obstacle to meet any proposal, and especially a procedure in an untried direction.

Men think as they are trained to think. Therefore, before advocating hygienic changes in factory conditions and processes, an educational campaign should precede. Let us make it our business as physicians to teach the cost of the human mechanism, the mechanics of humanity and the extravagance of human waste.

By accurate translation into terms of dollars and cents, humane dealing becomes good business. Charity and philanthropy have no place in industry, but kindliness is not charity, nor is generosity, alms-giving. A keen and wise employer generally is both kind and generous. For these reasons let us combine sense with sanitation, and hardheadedness with hygiene. Do not advise a $2,000 system of ventilation for a $4,000 shop, or outrun for frills the margin of return on the workers' capitalization.

It is through the neglect of costs that thoughtless and unconsidered statements and criticisms by social workers and amateur reformers chain the wheels of progress and retard real improvement, through arousing needless and obstinate opposition and by trying to drive rather than convince. Every wise employer must be governed by his own intelligence.

To accomplish hygienic reform in manufacturing—like any other reform, publicity of Fact is the first essential, and the Fact is that Hygiene pays.

Rich natural resources, new mechanical devices, wide markets, small selling expense, slight competition, and the flood of labor, for years tended to cheapen human life. But today industrial conditions are different. Labor is harder to get, competition is keen, selling is expensive, mechanical invention is limited, and natural resources are restricted. In the race for efficiency the human element is receiving more study, because costs must be cut and human skill is relatively too expensive.

Material, methods and men are the basic trinity of production. For years material and methods have received expert study, but men have been neglected.

Ten years ago, a philanthropic wave of welfare work carried away employers partly because it made a subtle appeal to the sense of masterly control, partly because it was a cheap form of advertisement, and partly because it seemed a way of getting things cheap off the human bargain counter. Even today, we hear employers speak of "doing things for their employees" when in truth it is for their own business advantage.

Of late another and a broader view has dawned upon the mind of the employing world, namely, that labor to be cheap must be efficient, and that human efficiency depends upon Motive and Environment. In this newer aspect, conditions of employment present an economic problem solely—not questions in philanthropy or charity.

Today one buys labor, one does not give employment. The housekeeper is no longer mistress, the iron-master is passing. The age of master and man has gone forever, the age of co-operation is here. Labor is a force to be sold, like electricity: it represents the capitalization of mankind. Skill, expertness, training, and experience are forming new social distinctions, and are breaking down the old lines of caste.

The problem of human efficiency thus is an economic problem solely, and sanitation is a factor in it. Sanitation is a means of saving dollars and cents, for it determines environment, and environment with motive is efficiency.

If then, factory sanitation has become a question of cost, not of sentiment, what part shall this national organization play in the great industrial world of today? What attention shall the American Public Health Association give to Industrial conditions?

The problems of sanitation and hygiene in industry are as individual and as difficult as are the questions of sanitation and hygiene in schools, or in municipalities, and the study of them is essential to the health of an industrial nation.

Industrial disease is a misleading term, used for convenience only, or through ignorance, to indicate certain pathological states, the results of insanitation in industry. Industry itself is never necessarily unwholesome. Industrial processes, it is true, are objectionable and crude oftentimes, but bad industrial conditions are always remediable. What steps shall this Association take to investigate, study and remedy them?

The Associations presents to the choice of members the following sections:

Laboratory,
Vital Statistics,
Municipal Health Officers,
Sanitary Engineering,
Sociological.

None of these sections deals with work conditions.

Permit me to propose that the Association take another step forward. Let this step be the inauguration of a section of Work Conditions - not of Industrial Disease or Industrial Hygiene, for that would limit the work unduly, but a section to explore the physiology, psychology and pathology of Work.

With 98 per cent. of our population engaged in daily toil, clinical material is not lacking for such a section.

A section on Work Conditions would attract interest, cordial support and financial backing from the host of able employers who are seeking to better Work Conditions in industry throughout the land, and would undoubtedly become a potent means of increasing the usefulness of our Association. May we not take this step forward now -not later, not next year, not when greed has died and ignorance has fled, but now, when forwarded by this meeting, given impetus by the present International Congress of Hygiene, and emphasized both by the meeting on Safety next week in Milwaukee and by the Congress in Indianapolis on the Conservation of Vital Resources, the new crusade for progress, for wiser and better living, shall have been started, which is destined to make of the United States the greatest and noblest nation of splendid human beings of which the world has ever dreamed.

POINTS OF CONTACT BETWEEN THE HEALTH OFFICER AND THE SOCIAL WORKER.

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Read before the Sociological section of the American Public Health Association, Washington, D. C.
September, 1912.

The coming together of health officers and social workers is one of the most important developments of social work, as it is also, in my judgment, in public health service. This drawing together of these two groups is not accidental nor altogether voluntary on their part. It is the inevitable result of higher standards of efficiency in social work and in health work, and of the development of medical and social science. Health officers and social workers have met because their work brings them to the same place, namely, the home in which there is both communicable disease and poverty.

The health officer has witnessed a great extension of the scope of his work in recent years. The number of diseases listed as contagious or communicable is constantly being extended. His sphere of influence is also being extended to diseases that are not necessarily communicable. From being regarded as a *superman*, to bring into action huge and unusual engines of warfare when some plague is at our doors, he has come to be regarded as a *real* man, bringing into action the usual and ordinary human resources every year, and throughout the year, against those diseases which exist in every community, and all the time, but chiefly in the homes of the poor. The health officer has comparatively little to do with the well-to-do; their medical advisors can care for them. It is among those who are already in the "submerged tenth," or on the border line, that disease spreads most quickly, finds least resistance, and works the greatest havoc. Does not every health officer find that one of the greatest obstacles in the way of control of contagion is poverty, expressing itself in terms of overcrowded rooms, undernourished persons, and insufficient care for the sick.

These are, however, the very circumstances and conditions with which the social worker is also contending. If the social worker were to confine himself strictly to family rehabilitation, to "case work," he would, nevertheless, be brought into frequent contact with the health officer in the homes of the poor, and there they would be contending with the same obstacles and striving toward the same ends. Poverty and disease are reciprocally and mutually cause and effect, and no one, of whatever profession, can deal effectively with either without taking the other into account at every stage.

The social worker can be of great assistance to the health officer in helping to secure and sanitary conditions in the homes of the very poor in which communicable disease is found.

From this original point of contact, however, in the home, there stretches a wide range of opportunity for fruitful coöperation. The social worker, if he is to preserve his mental and moral integrity, must be interested in the prevention of poverty. The health officer, in seeking to prevent disease, is doing exactly the same thing, though designating it by a different phrase. Recognizing the health officer as one of his strongest allies, the social worker can be helpful to the health officer in a number of directions. The social worker has the public ear from a different angle, so to speak. He is in touch with those who make public opinion. Throughout the community there is a presumption that he is disinterested. He has perhaps almost an unfair advantage in that his calling is generally recognized as an altruistic one.

The social worker can help the health officer first to secure adequate appropriations for carrying on his work. Few health departments measure up to anything like an adequate performance of the duties imposed upon them by law, and chiefly by reason of the fact that in the competition for public funds, they have been unable to successfully press their claims as against those other departments which have the support of powerful interests. Social workers have been actively concerned in many localities in the securing of adequate appropriations for public charitable institutions. They are now finding that it is quite as strictly in the line of their duty to press for adequate appropriations for the preventive work carried on by health departments. A notable example of successful effort in this direction was the comprehensive campaign carried to a successful conclusion by the Charity Organization Society's Committee on the Prevention of tuberculosis in New York City a few years ago, whereby the appropriation to the Department of Public Health for its tuberculosis inspection and supervision was increased by some three hundred thousand dollars per annum.

The social worker can be of substantial service secondly, to the health officer in supporting proposed legislation affecting the powers and duties of health authorities. A large part of existing health legislation is based on an obsolete conception of the health officer, the nature of contagious diseases, and of the methods of their prevention. Proposed legislation extending the powers and duties of health officials is apt to be looked upon askance if supported only by health authorities. Medical societies are apt to be half-hearted, if not indifferent or hostile. The active and organized support of social workers and of the agencies which they represent would turn the scale in many cases in favor of affirmative action.

In addition to legislation and appropriations, which may be termed the essential conditions of efficient health service, there is also necessary an enlightened and interested public opinion. The final limitation on the efficiency of health administration is the actual public sentiment of the locality. This public sentiment, however, is a matter of popular education. Communities can be educated just as individuals can be, and can be re-educated when they have been wrongly educated. The lay organization, if it proceeds in close coöperation with the medical profession, and with full scientific support for its statements, can be of enormous assistance in creating a public opinion which will not only make possible, but will require high standards of public health administration.

The social worker can render valuable coöperation to health officers in these and other ways. It is also true that the health officer can render invaluable support to social workers in the care of needy families and other forms of direct relief and assistance. The social worker is constantly dealing with families who are, as it were, in a peculiarly exposed condition from a sanitary point of view. It is inevitable that the families who come to the social worker will be found to be occupying many of the most unsanitary tenements and houses, will be found to be living in conditions of unhealthy and indecent overcrowding, and by reason of the facts and conditions which have brought them into distress, will be in many cases of low viatlity and ready to fall easy victims to the pestilences that walk in the darkness of unlighted rooms. The trained and conscientious social worker feels it one of his imperative duties to place all the families assisted by him under sanitary conditions, to raise their standards of living in whatever ways may be necessary to counteract further loss of vitality and loss of character. In all this, a strong, courageous, efficient health administration is his most important ally—a health administration which will have secured from the municipality the necessary funds for the construction of hospitals for the isolation of contagious diseases, a health authority which maintains these hospitals with such efficiency that there is not added to the natural fear of a pest house the further horror of an institution overcrowded, undernursed, insufficiently fed, and ruled by brute force; a health administration which has inspired the formulation and adoption of adequate housing regulations, and which fearlessly enforces minimum standards of light, ventilation, and number of persons per room, regardless of whoever the owner may be; a health administration which watches with vigilant eye against those impurities in water, milk and food supplies which bring typhoid, and promote infant mortality; a health authority which sends physicians and nurses to the homes of the tuberculous poor with instructions and facilities whereby the probability of the spread of infection may be decreased,—in these and countless other ways the health officer can buttress and strengthen the relief agencies and social work generally of the community.

And, of course, aside from individual families, everything which the health officer does looking toward the prevention of disease is, *per se*, also the prevention of poverty. It is almost impossible to overestimate the extent to which the problems of social work will be simplified when health administration is brought up to anything like its reasonable possibilities. The population of orphan asylums and the burdens of child-caring agencies will be enormously diminished; the number of families applying for relief because of the sickness or death of the wage-earner will be greatly reduced; the number who become permanent burdens in almshouses, homes for incurables, and other charitable institutions will be greatly diminished. It is, therefore, the plainest possible duty of all social workers to use every effort, both as individuals and in their official capacities, to uphold, strengthen, dignify and develop health administration.

Some words of caution, though not of misgiving, may be in order. There is danger that points of contact may become points of conflict. The social worker is somewhat new in this field, and naturally at first may be a bit awkward. In this as in every other department of governmental activity, it is difficult for the outsider, the private citizen, or private organization, to understand all the facts and to do full justice to public officers. One of our most unfortunate traits as an American people is that of too readily believing ill of our public servants, of not exercising a careful and discriminating judgment as between fact and rumor, of not seeing in due proportion necessary limitations upon official action, of not waiting until all the facts are in before forming a final opinion and acting thereon.

Dear Mr. Health Officer, if some social worker seems to you unfair, unjust, incorrect, superficial in his judgments of your activities, be patient with him, err on the side of *showing* him not once merely, but repeatedly; remember that he is no X-ray apparatus, that he can not see through your department and know what you are doing unless you tell him. Remember how deeply and vitally interested he is in effective health administration; take the utmost pains to show him the facts in every detail, and hear his point of view patiently. Deal with him with the utmost frankness; do not let the seeds of doubt, distrust and suspicion ripen and bear fruit. Whether the social worker be right or wrong, he can do a great deal of damage. It is important to obviate and avoid the damage, even though he may be mistaken.

Dear Mr. Social Worker, be very sure you are right before you go ahead; remember that powers and duties are apt to be conferred on health officers in large and in general terms, and that the application and enforcement of those laws must be determined in considerable degree, not by the largest meaning which *might* be read into them, but by the extent to which the public sentiment of the community has been interested and informed. Remember that the health officer probably has imposed upon him by statute at least five times as many duties as he can efficiently perform with the staff and funds provided for him by the fiscal authorities. Remember that it is easy to diminish public confidence in a public official, but very difficult to restore it; that through coöperation one plus one equals five, while through conflict one against one equals nothing.

Nevertheless, when all has been said, it is probably the social worker who will know first and see most clearly the strong and the weak points of health administration. If the weak points greatly outweigh the strong ones, and if, when all has been done, all efforts at coöperation fail, all efforts at joint activity come to naught; if, after every reasonable opportunity, it becomes evident here and there,—and it would only be in a small minority of localities,—that the health officer was appointed not to enforce the law, but to stand in the way of its enforcement; not to serve the public, but to serve the politician; not to promote public health, but to promote private gain, then it is very likely the social worker whose uncomfortable duty it will be to bring to bear upon the situation the wholesome influence of an enlightened public opinion. It would be a distressing duty, frequently misunderstood, but nevertheless it is an imperative one. The relation of efficient health administration to a constructive social program is so vital that nothing should stand in the way of securing the real thing. It is hardly necessary to ask this body of health officers, who are here because they believe in progress, to give their moral support to the social worker in those instances in which it becomes his duty, in order to secure efficient health administration, to oppose, expose, and perchance even to secure the removal of a particular health official.

Do not let me seem even to overstate the probable points of conflict. I know the social workers of this country; I know their attitude, spirit, purpose and fibre. I know that they look to you health officers, and to you physicians, for guidance and leadership. We expect you to take the lead. We want you to stand forward in the limelight when you are doing a good thing, even if it happens in some particular case that we have helped to set the stage and prepare the limelight. We want to see your position strengthened, your tenure of office more secure, your remuneration more adequate. Do not be afraid to lead. There may be times when new ground is to be broken, when public opinion may be uncertain, when it is better for the social worker to be put forward on the firing line. He is not in public office, and not subject to the recall. His budget is not provided by other public officials; he can properly take some chances which it might be wiser to enable the health officer to avoid for the time. In such cases do not hesitate to call upon us and send us to the front. But when we get there, if the battle goes our way, do not forget that you sent us, and do not feel that we are trying to carry away the laurels. We shall be quite ready to take whatever place may be assigned to us on the following day, quite ready to serve again in the reserves.

The work we have both been called upon to undertake is so great that, under the most favorable circumstances, it will keep us all fully occupied for a considerable time to come. Team work is essential. Give us half a chance and we will get together and stay together. Community of interests will succeed points of contact, and health officer and social worker together will lead the community to direct its energies and expend its resources in bringing itself to an efficiency heretofore unrealized.

American Journal of Public Health

Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. OCTOBER, 1912. Number 10

$2.00 a year. 20 cents a copy.
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PHILIP P. JACOBS, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

SEPTEMBER SANITARY CONGRESSES.

The month of September was marked by the holding in the United States of three international congresses dealing entirely in two cases and through a single section in the third case, with the problems of public health. The Eighth International Congress of Applied Chemistry (with a section on Hygiene) met in Washington and New York between September 6 and September 13. The American Public Health Association met in Washington on September 18, 19 and 20. The Fifteenth International Congress on Hygiene and Demography met in Washington between September 23 and 28. The second of these three associations may rightly be included with the others, since it is international in its scope within the limits of the North American continent, and since its meeting this year was of so peculiarly notable a character.

The International Congress of Applied Chemistry held its inaugural meeting in Washington under the patronage of the President of the United States and the rest of its sessions in New York, the sectional meetings at Columbia University and the general meetings at the College of the City of New York. 2,173 members were in attendance and 535 papers were read. The management of the Congress was admirably efficient and the social features provided left little to be desired. At the hygiene section, which met under the presidency of Prof. W. P. Mason, 19 papers were presented with an average attendance of 26 persons. Naturally these meetings were smaller than those of the congresses devoted entirely to public health, but many of the papers presented were reviews of current practice in sanitary chemistry which were of unusual value. A paper by Dr. Samuel Rideal of England resulted in the appointment by the Congress of a committee of three members to co-operate with a similar committee from the International Congress on Hygiene and Demography in the formulation of an international standard method for the testing of disinfectants.

The American Public Health Association held its fortieth annual meeting at the New Willard Hotel under the presidency of Dr. John N. Hurty. The meeting was noteworthy for two reasons. For the first time the newly organized sociological and sanitary engineering sections held meetings rounding out the organization of the Association, so that it is at last completely representative of all the interests involved in the modern public health campaign; and at both general and sectional meetings the character of papers and discussions reached a level of excellence which has never been equaled in previous years.

Since the papers presented before the Association will be published in this JOURNAL it is unnecessary to discuss them in detail. A word only may be said as to certain prominent tendencies. By far the most significant of these was the emphasis on sanity and perspective in public health activity. The day has gone by when it was perhaps necessary to catch public attention by the depiction of the real or imaginary horrors of indiscriminate unsanitary conditions. There is now ample popular support for public health activity. What is needed today is intelligent direction which shall indicate the most profitable lines of attack so that the public funds may be used with a proper sense of proportion. Such intelligent direction was clearly manifest in the deliberations of the Association this year.

Then new sociological and sanitary engineering sections were launched in the most auspicious manner. In both, the meetings were enthusiastic and inspiring; and the sanitary engineering meetings in attendance and in the value of papers and discussions were as successful as any ever held by either of the older sections of the association. Among others there were admirably rounded symposia on refuse disposal and on water supply and a stimulating discussion of the qualifications of the sanitary engineer for administrative public health work.

The crowning event of the month was of course the Fifteenth International Congress on Hygiene and Demography (under the presidency of Dr. H. P. Walcott), by far the most important sanitary convention ever held on this side of the water; 3,385 members were registered for the Congress of whom 131 were official delegates from foreign countries.

The Congress was opened by President Taft in a felicitous speech in which he referred particularly to the sanitary triumphs of the Panama Canal, and representatives of twenty-eight nations responded to the official roll-call. General lectures were delivered during the Congress by

Professor Rubner, Sir Thomas Oliver, Dr. Bertillon and Dr. Zahn and 510 papers were presented before the nine sections. Meetings were held in the New National Museum, the Pan-American Union and the Continental Memorial Hall and the arrangements in this respect proved altogether adequate. The Memorial Hall and particularly the Pan-American building furnished a dignified and beautiful setting for such an occasion and those who remember the Tuberculosis Congress four years ago can take satisfaction in these additions to the meagre facilities which existed at that time. There were receptions at the White House and the Pan-American Union and the New National Museum and boat trips on the river but no attempt was made at the elaborate entertainments which have made European congresses so enjoyable. Some of our foreign visitors expressed themselves as well pleased at the attention to business which resulted, but in future international conventions in this country a happy mean might be struck between the two extremes. The most serious drawback to the comfort of the congressists was the weather. It was most unfortunate that our friends from abroad should have seen Washington under such unusually unfavorable conditions.

It is of course impossible to attempt any general summary of the many important papers presented before the nine sections of the Congress. Abstracts of 243 of them were distributed in a volume of 297 pages at the meeting. Among matters of especially vital interest may be mentioned the symposium on hookworm disease in joint session of Sections I and VIII in which the results of American experience were well presented; the discussions of school inspection in Section III, the many valuable papers on occupational disease and occupational statistics in Sections IV and IX, the symposium on bacillus carriers in Section V in which the vaccine treatment of carriers was fully discussed, the papers on public health organization in England, Germany, Denmark, and the United States in Sections VI and VII, the symposium on the sanitation of foods in Section VI and the discussion of the spread of disease along routes of travel in Section VII.

The most striking single incident of the Congress came in the joint symposium on poliomyelitis held by Sections I and V when Professor Rosenau made the preliminary announcement of his experiments on the transmission of that disease by the biting stable fly, *stomoxys calcitrans.* Here were the leading experts of the world taking counsel together as to the best means of fighting the obscure and sinister malady against which we have been almost helpless. After the formal papers the solution of the problem seemed as far off as ever, when an unannounced speaker in the discussion reported results which, if they are confirmed, may make the suppression of this disease as simple as that of yellow fever. It was one of those dramatic moments which will not soon be forgotten and which make clear the splendid practical results of sanitary science, so often obscured by its slow and gradual growth.

The briefest review of the Congress would be incomplete without a word about the Exhibition. Dr. Schereschewsky deserves the thanks of all public health workers for this admirable exhibit. It must have astonished all Americans to see how effective a showing could be made and even some of the German visitors familiar with the wonderful exhibitions at Dresden and elsewhere had only praise for the results achieved. The topical arrangement of the exhibition was carried out with entire success, there was almost nothing shown that was not of value, and some of the exhibits were of high merit. Among the notable exhibits were those on mental hygiene and sex hygiene, the five sections on industrial diseases, in which the Massachusetts State Board of Health and certain private corporations were the principal contributors, the water and sewage models of the American Museum of Natural History, the food exhibits of the Bureau of Chemistry and the Bureau of Animal Industry, the exhibits of dental hygiene by the Rhode Island State Board of Health and others, the statistical exhibits of the New York City Board of Health and the Prudential Insurance Company, and the fly exhibit of the Asheville Board of Health.

Among the resolutions adopted by the Congress mention need be made of only one of the highest importance. This was the recommendation that the Permanent International Commission be instructed to establish a permanent bureau for future international congresses at the Hague. Medicine, pharmacy and statistics have each a permanent international bureau of this sort and it is a cause for congratulation that sanitary science too has taken this step forward in world organization.

THE PROPHYLAXIS OF BUBONIC PLAGUE.

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Read before the American Public Health Association, Washington, D. C., September, 1912.

So much has been written of late regarding plague that it seems almost wanton to discuss the subject before a body of men whose lives are given over to the study and control of epidemics of disease, both of exotic and domestic origin. It is however sometimes of value to consider a great subject like this in syllabus form, to remove the dross of detail, to evaporate the diluent of personal experience and to crystallize the salient facts of the subject. Long has humanity awaited deliverance from the bondage of plague and not the least of the great scientific achievements of the century in which we live has been the discovery of its causative organism, and the unraveling of the ramifications of its spread. We have taken information from every portion of the globe, have assembled and correlated it, and evaluated the formula upon which prophylactic measures are based. Like St. Paul, we are debtors "both to the Greeks and to the barbarians, to the wise and to the unwise," and the resultant product has worked to the lasting benefit and protection of the human race. Science has placed in our hands, as it were, a high powered weapon of precision and it is no longer necessary to use the blunderbuss of absolute quarantine to frighten off the plague, nor to burn cities to drive it out once it has gained entrance.

The prophylaxis of plague primarily comprehends the single basic fact that it is a rodent disease, and that if man allows himself to come in intimate contact with rodents and therefore to be exposed to the danger of plague, t is his own fault, Secondly, it has been recognized that the rat and his congeners are the great agents in the extension of the acute form of the disease, and that the ground squirrel and its allied species are responsible for the perpetuation of the disease in chronic form.

The prophylaxis of plague thus takes on two different phases, the control of plague in the genus *mus*, and the control of plague in the genus *marmota*. The one is more or less a matter of instant expediency, the other is a measure striking at the very roots of plague itself. If rodents are prevented from gaining access to the home of man, there is little danger of an outbreak of human plague; if the exodus of rats from plague foci is prevented, then the spread of the disease is thwarted; if the disease is checked among the *marmota*, then the infection of the *murinae* is rendered impossible.

These are basic principles. The making of these simple facts to live and work is a matter of an infinitude of administrative detail and labor, a close study of local conditions and an accurate knowledge of the habits and bionomics of the different species concerned.

Thus far nothing has been said regarding the rôle played by the siphonaptera as the vehicles of dissemination of the bacillus pestis from the carcass of the plague infected animal to the body of the healthy man. While the flea does enter into the scheme of the prophylaxis of plague, it is in a minor rôle, his host occupying, so to speak, the center of the stage, because if we render the home of man flea free, we can keep it so, provided we exclude those animals which would bring fleas into it. For the practical prevention of plague it may be assumed that rodents are the chief animals engaged in carrying fleas into the home of man.

Plague prophylactic measures therefore arrange themselves under the following heads:

1. The protection of the home of man against rats.
2. The prevention of the migration of plague.
3. The protection of rats against infection.
4. Immunization of the individual.
5. Periodic rodent surveys.

In order to protect the home of man against plague, it is necessary, first, to make it impervious to the entrance of rats, and secondly, to maintain the premises in such condition that rats will not want to enter them, even if they have a chance. Nothing need be said here regarding the extermination of the rodent species, because we are not now considering the eradication of plague, but its prevention, and therefore the enormous labor and great expense which would be entailed by an attempt at extermination of rats would not be warranted. Furthermore, it may as well be admitted that the extermination of the rodent species in any place where plague might come has thus far proven the unending labor of a Sisyphus. It is true that poisoning, trapping, shooting and exposure to natural enemies, combined with rodent eviction, starvation and the prevention of multiplication will greatly diminish their numbers, but thus far there has not been recorded a single instance of their complete extermination. The limitation of the species is an important adjunct to eradicative work, because by reducing the number of rats their chances for personal contact and interchange of fleas is thereby rendered less frequent and less probable. This brings about what is virtually a dilution of the infectible material, and if carried far enough will of itself stamp out plague in rats. As a purely prophylactic measure, however, wholesale rodent slaughter is not indicated. The all-important thing is to prevent the rat from gaining access to the home of man. The methods of accomplishing this have been fully discussed elsewhere,* and it is merely sufficient to state here that there is no building which cannot by one means or another be made impervious to rats. The exclusion of the rat should not be confined to the place where man eats and sleeps, but should include as well every building which is used for any purpose whatsoever. It is the great and enduring fact of plague prevention that he who dwelleth rat free taketh not plague.

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* See "The Rat and its Relation to the Public Health." P. H. B. No. 30. U. S. Public Health Service.

The migration of rats particularly migrations in ships is responsible for the wide dissemination of plague. It is important then that rats, particularly those from plague foci, be prevented from leaving such localities. This measure entails the supervision of maritime commerce, the rendering of ships inaccessible to rats, their extermination, once they have gotten on board a ship, and the prevention of their landing from water craft, particularly those hailing from plague foci. This must be done with the least possible hindrance to commerce, and owners and masters of ships should be brought to realize that it is to their benefit as well as to the interest of shippers that vessels be kept rat free. This may be accomplished by periodic fumigation, the use of rat guards and other ship rat-proofing methods, and the building of ships containing automatic apparatus for the capturing of rats as soon as they come aboard.

The migration of rats within cities themselves should also be prevented. It should be the aim so far as possible to force them into the sewers, allowing them to continue their subterranean existence without coming in contact with man. This applies particularly to rats from the water-front, because it is in such places that epizoötics of plague usually first appear.

In this connection it may be remarked that it is also in the shipping districts that human cases usually first appear, and it has been the observation of Surgeon General Blue that such cases most often occur among sailors, or in sailors' boarding houses. This fact requires the rat-proofing of all water-front districts, the special observation of passengers and crews coming from such localities, and the prohibition of shipping crew or allowing shore liberty at infected ports. The great danger of the migration of plague from such places lies in the emigration of rats. The danger from human cases is an almost negligible factor, yet in this particular it should receive careful attention.

While rats are the cause of enormous losses every year on account of the property which they injure and destroy, and while it is desirable to limit the number of this species as far as possible, if we must have rats, they should be kept healthy, at least so far as plague is concerned. As has been shown above, if they are prevented from migrating from plague foci, there is no danger of rats becoming infected in regions where the disease does not exist provided that they are not permitted to come in contact with other animals having the disease. Plague in rats is more or less a secondary and accidental infection, as it is in man. The disease spreads among them like a flame in the dry grass. It is an acute, fulminant outbreak and develops a rapidity of spread which is directly as the amount of infectible material, and the opportunity which the rodent population has for coming in close contact one with the other. In ground squirrels and the allied species, the disease assumes a chronic character after the first preliminary outburst and there it smolders like a bed of embers ready to burst forth in flame when fresh fuel is added. Such a condition is brought about by the transfer of the disease to rats in the area where the life zones of the two species overlap. If we separate the two species by a strip of land which neither one of them is permitted to occupy we prevent the spread of plague from one to another. This question has three aspects, the prevention of the spread of the disease among the *murinae*, *i. e.* the control of acute rodent plague; the prevention of the spread of the disease from the *murinae* to the *marmota* and vice versa; and the control of plague among the *marmota*.

The latter measure means the stamping out of the disease in the enzoötic foci among tarbagans and ground squirrels and is not only a national matter as it is with Russia in the Trans-Baikal and the United States in California, but is also an affair which should command an international interest. If the strong nations of the world will unite to form a permanent international plague commission and will support it with funds and authority, our generation will see the relegation of plague to the category of rare and almost extinct diseases.

The question of the immunization of the individual against plague may be mentioned merely to point out that as a wholesale prophylactic measure it is altogether impracticable because of its cost, the short period of the immunity conferred, and the discomfort and danger which are incident to its administration. At the present time its usefulness seems to be confined to the protection of laboratory workers and others who are in constant contact with plague material. A serious objection to its use is the fact that it is a measure of temporary value only, and by reason of the feeling of security which it engenders it defeats those more important prophylactic measures which are directed at the transmitting and disseminating agents themselves. Its wholesale use as a prophylactic is therefore to be condemned.

Perhaps the most important single measure which may be adopted by communities as a preventive measure against plague is the periodic inquiry into the health of the rodent community. This is relatively inexpensive, and a small force of well trained rat trappers can capture a goodly number of rodents from the various portions of a city in a relatively short space of time. The machinery for the examination of these animals need not be large, nor intricate, yet if this work is carried on with precision and accuracy it is the means of determining the presence of plague in the rodent community before it has had an opportunity to attack men. Once plague is so discovered it may be speedily stamped out at a comparatively small cost, whereas if the disease had been allowed to gain large headway among rodents, there to go unchecked until one or more human victims had been claimed, the expense of eradication would be very high, and the harm which commerce would receive would be great and far reaching. However much we may fear plague from the humanitarian standpoint, it should always be borne in mind that in the end the great harm from plague comes through its injury to commerce. In this way, although it acts indirectly, it is as much a menace to health as if it attacked directly because anything which harms commerce throws people out of employment and reduces their wages, thereby lessening their food supply, depriving them of adequate clothing, and forcing them to live under conditions which are prejudicial to health.

In closing this paper there is one single thought which it is desired to impress. It is the duty of every municipality in those countries having a membership in this association to begin and continue an active warfare upon the rodent species. Above all, every measure should be taken which will keep the sanitary authorities constantly informed as to whether or not plague exists in the lower animals of any given community. Once it is found therein, it is equally the duty of the sanitary authorities to take prompt and active measures for its eradiction, and it is the bounden duty of our citizens to provide the necessary funds for the carrying out of such work. This is a true form of health insurance, paying the largest dividends, and granting the greatest security from the pestilence which traveleth in ships in the body of the scavenger of the ages and striketh in the darkness of ignorance and carelessness.

A MEASLES OUTBREAK IN CHICAGO.

G. B. Young, M.D.
Commissioner of Health, Chicago, Ill.

Recently there came under my observation an outbreak of measles, in which the facts were so striking and have such an important bearing upon both the transmission of the disease and the methods for its control that it seems worth while to report it.

Thirteen children attended the birthday party of one of the number. Two of the children had been suffering for three days with severe "colds," and had been kept out of school and indoors in order that they might be well enough to attend the party on Saturday. One of the children at the party I had myself treated for a very severe attack of measles about a year previously. One of the children, one of my own, had had an attack of moderate severity but perfectly distinct in type three years before. It so happened that most of the children at the party came from different neighborhoods and that in most instances the acquaintance which led to their being present at the party was an acquaintance between the children and not an acquaintance of any intimacy between the families concerned.

The day after the party the two children first mentioned developed typical cases of measles, but owing to the circumstances explained above, the fact that their children had been exposed to measles at the party was not made known to a number of families. Within eleven to fourteen days every child at the party except the one who had had an attack within the year had developed measles.

The case of my own child was sufficiently unusual to be a matter of interest as bearing on the question of an occasional appearance of measles with a perfectly anomalous history. Eleven days after the exposure at the party this child was seized with a fit of trembling and began to cry with severe headache. Within a few hours thereafter she was covered with a profuse eruption which at first was not typical, but in a few hours presented a perfectly typical appearance of measles. It was recalled that twenty-four hours previous to the onset of the attack the child had for an hour or so seemed to be a little less active than usual but not enough so to suggest to any of the family that she was ill.

One of the children at the party, B. F., developed a "cold" twelve days after the party. Her mother had not heard of the other cases of measles but wished to keep the child away from the convent school which she was attending. The child, however, begged to be allowed to go for some special reason and was permitted to do so. This was on the second day of the catarrhal stage. Some hours after reaching school she seemed to be a little indisposed and the fact was brought to the attention of the Mother Superior. It so happened that just before this particular moment another child had been taken sick with a malady of an undetermined nature, and following the custom of the school, had immediately been isolated in what was known as the rest room until such time as she could be taken home, consequently there was no place in which B. F. could be temporarily put. It also happened that there was a class of girls considerably older than B. F. who were being prepared for their first communion, and were receiving instruction in a room apart from the rest of the school. As the principal was going to this room to give the instruction just at the time when it was noticed that B. F. was not well, she took the little girl, aged eight, along with her into the room where the class of older girls were awaiting instruction. There were fourteen of these girls. Later B. F. was sent home and the next day was down with the measles. Exactly twelve days from the date on which this class was held all fourteen of its members were taken with measles.

In addition, a number of the younger scholars who had been in the room with B. F. developed measles on practically the same day. In all, I have heard of forty-seven cases directly traceable to the sick children who went to the Saturday party.

I have made no attempt to run down the secondary and tertiary exposures, but have no doubt that if I could have done so it would have been easy to demonstrate that the fruits of these two cases ran up into the hundreds. One exposure, I know, went from Chicago to Kentucky, developed the disease there, and probably started a fresh focus.

Now, the remarkable unanimity with which the fourteen girls came down on the twelfth day is of interest as confirming the generally accepted length of the period of incubation, but as this period of incubation has been well established before, the occurrence of the disease in these cases is not of any special importance, though, as already said, the unanimity of onset is of interest; but the striking feature of this group of cases is that fourteen half-grown girls who certainly did not come into very immediate contact with a little girl of eight brought into the room while they were receiving religious instruction should all develop measles at all, let alone on the same day. Furthermore, the nine or ten children in the same schoolroom with B. F., who developed measles, did not come into any intimate or immediate physical contact with her.

It is difficult, therefore, to get away from the conviction that the prompt aerial transmission of the disease would seem to be pretty thoroughly established by this group of cases. Certainly contact could not have been a factor of any importance. The fourteen girls were seated in a large room, the little girl seated at one side of the same room. The period of exposure did not last more than one hour, if so long.

The other matter of interest is the demonstration of the entire futility of attempting to control measles by prolonging quarantine of cases the presence of which is not known until the eruption develops.

I have not taken space to go into the details, but I am satisfied that in nearly all, if not all, of the original ten cases there was nothing to have warned the parents of the children concerned that they had been exposed to a child with measles in the catarrhal stage, consequently each of these children, when in turn they developed the catarrhal symptoms, were permitted to come in contact with large numbers of other children in the school and elsewhere, as it seems that most all of these cases failed to be attacked with sufficient violence at the onset of the disease to cause them to be kept in bed.

We began in the Chicago Health Department in January, 1912, to terminate the quarantine of measles cases as soon as the temperature had been normal for twenty-four hours, following in this matter what seemed to be a reasonable deduction of Anderson and Goldberger of the Hygienic Laboratory who found that they were unable to transmit measles from monkey to monkey after the febrile stages had passed. It is too soon as yet to judge the result of this procedure, one reason being that the profession as a whole has not yet begun to take advantage of the change in procedure.

As far as we can tell, however, this increase in leniency has not resulted in any particular increase in the spread of measles. I must confess that, in view of the facts in the small outbreak given above, to my mind it is difficult to avoid the deduction that it is unnecessary to do more in measles than to keep out of school or away from other intimate or immediate contact with other children any children from families where a case of measles is occurring or has recently occurred.

DIPHTHERIA CARRIERS AND THEIR RELATIONSHIP TO MEDICAL INSPECTION OF SCHOOLS.

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Read before the Municipal Health Officer's Section of the American Public Health Association, Washington, D. C., September, 1912.

The recognition of the presence of diphtheria bacilli carriers among school children furnishes another strong argument in favor of efficient medical inspection of schools. With the increase of our knowledge in regard to the bacteriology of diphtheria, we have learned that the Klebs-Loeffler bacillus may linger for varying lengths of time in the nose and throat of persons who have recovered from an attack of diphtheria. In recognition of this fact most of our State Boards of Health have during recent years changed the basis for the release of quarantine for diphtheria from a definite time limit to the absence of diphtheria bacilli from thenose and throat as determined by bacteriological examination. According to the old time limit, the usual period of quarantine for diphtheria was from 28 to 35 days. According to the culture method the average period in Iowa has been about 16 days. Unfortunately, however, there are some in whom the bacteria remain so persistently that they can still be found for from five to seven weeks, in one of our cases for seven weeks and in one case on record for 23 weeks after clinical recovery from the disease. Another condition which has been the subject of considerable study in recent years has been the presence of diphtheria bacilli in the throats of persons who are not, nor, so far as known, have ever been affected by diphtheria. These diphtheria bacilli carriers are of most frequent occurrence when diphtheria is prevalent in a community. Fortunately the bacilli living under such conditions are frequently of low virulence and in some instances have lost their disease-producing power entirely. On the other hand, their virulence is often of full strength and even though they may not produce any disease in the carrier, when transferred to other persons, they may produce the disease in its most virulent form. It is very certain that diphtheria has been kept alive for months in institutions and communities by such carriers. Indeed it is quite probable that carriers with either a normal throat or a slightly "sore" throat, are the source of more cases of diphtheria than persons affected by well marked cases of the disease.

In view of such, the examination of the throats of school children is of the highest importance whenever there is an outbreak of diphtheria among them. Such examinations should consist both of an inspection of the throats and of swabbing the throat for the purpose of making a bacteriological examination, for although it has been shown that the specific germs are found most often in throats that are "sore" as indicated by excessive redness, swelling or subjective symptoms, they are also frequently found in throats that are perfectly normal. The proportion of children not affected by what is recognized as clinical diphtheria but who are diphtheria carriers varies naturally according to the extent of exposure. In 1894, Park* found virulent diphtheria bacilli in about one per cent of healthy throats examined in New York City. In 1907, Fisher,† examining the throats of 4,081 healthy individuals living in the Connecticut Hospital for the Insane, where there were a number of cases of diphtheria, found that 2.08 per cent of them were diphtheria bacilli carriers. It has been shown by the examination of a large number of cases, that when clinical diphtheria is not present in a community about one per cent of the population are carriers of diphtheria bacilli, but that when diphtheria is present in a community the percentage is very much higher--ranging from 5 to 10 per cent. The percentage of carriers among healthy persons who have been quite directly exposed to infection, is often as high as 50. On account of the greater exposure of children in schools, the proportion of carriers among such children would naturally be higher than among the population in general. During the winter of 1910 the Chicago Board of Health found that 25 per cent of the children of two schools were diphtheria carriers. Last winter 25 cases of well recognized diphtheria occurred in two of the schools of Davneport, Ia. Bacteriological examination showed that 20 per cent of the other children of these schools were diphtheria carriers. The virulence test was positive in 90 per cent of the cases.

The controlling of diphtheria carriers in our public schools has been successfully done in a number of our larger cities. In the vast majority of localities, however, the solution of the problem by the culture method has not yet been attempted. The general public has little conception as to the significance of healthy diphtheria carriers and unfortunately there are still some physicians who deny the danger from this source. There is not yet, to my knowledge, a single State Board of Health in the United States that has adopted specific rules and regulations with reference to the finding and control of diphtheria carriers in the public schools. In most places, dependence is placed on the general rules governing cases of diphtheria and those intimately associated with such. In a number advice is given by correspondence whenever specific instances arise. Although our larger cities will take care of their sanitary problems quite independently of the

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*Park, W. H.—Report New York City Board of Health 1894.

†Fisher, J. W.—A Diphtheria Epidemic. J. A. M. A., Feb. 6, 1909.

State authorities, the vast majority of communities will be guided principally by regulations of the State Boards of Health.

Procedure recommended for the control of diphtheria carriers in the public schools whenever diphtheria (clinical) occurs among the school children:—

1. WHENEVER THERE IS AN OUTBREAK OF DIPHTHERIA AMONG THE CHILDREN OF A CERTAIN SCHOOL, THE THROAT (AND IN SUSPICIOUS CASES, ALSO THE NASAL CAVITIES) OF EVERY PUPIL, TEACHER AND OTHER PERSON IN SUCH SCHOOL SHOULD BE EXAMINED BOTH BY INSPECTION TO NOTE THE CONDITION OF THE THROAT AND BY BACTERIOLOGICAL EXAMINATION.

2. THOSE WITH A "SORE" THROAT SHOULD BE SENT HOME IMMEDIATELY AND SHOULD NOT BE PERMITTED TO RETURN TO SCHOOL UNTIL PROVED BY BACTERIOLOGICAL EXAMINATION NOT OR NO LONGER TO BE DIPHTHERIA CARRIERS, OR IN CASE THE BACILLI PERSIST IN REMAINING AFTER A THOROUGH ATTEMPT AT REMOVING THEM, THE PATIENT SHOULD REMAIN ISOLATED UNTIL IT IS PROVED THAT THE BACILLI ARE NOT VIRULENT.

The diphtheria carrier, rather than the premises should be quarantined. The carrier should remain somewhat isolated from the other members of the family but such other members should be permitted to go in and out of the house to attend school or their places of business. It is advisable however to have the house placarded to serve as a warning or notice to have persons not members of the family, stay out. The card may be labeled as follows:—

"CARRIER OF DIPHTHERIA HERE—KEEP OUT."

It is likewise advisable to place in the hands of the family a circular explaining what is meant by a diphtheria carrier and the danger of such and advising them to call a doctor to the house to treat the nose and throat in order to remove the carrier condition. In case the family prefers I believe it to be advisable to have the medical work done by the health officer, if not a practicing physician, at public expense.

The following measures may be employed to rid the nose and throat of diphtheria bacilli:—

1. *Local Application of Disinfectants:* –The nasal cavities and throat should be sprayed with a mild disinfectant such as a solution of hydrogen dioxide (0.5 per cent by weight of absolute hydrogen dioxide which is the solution of hydrogen dioxide of the U. S. Pharmacopea diluted with 5 parts of water) or of some mild alkaline disinfectant as Carl Seiler's solution.

The throat will permit of more severe measures than the nose. A solution of 1 per cent by weight of absolute hydrogen dioxide may be used as a gargle or the surface may be swabbed with a 5 per cent solution of silver nitrate. Care should be taken not to have such an excess of the reagent on the applicator that it will trickle to the larynx.

The local application of such disinfectants usually succeeds in removing the carrier condition in a few days. Sometimes however, more drastic measures must be employed before the germs disappear. Knowing that the crypts of the tonsils afforded a good hiding place for the bacteria we have tried the disinfection of such by the use of a swab dipped in a 10 per cent solution of silver nitrate and well introduced into the crypts. By so doing we succeeded in getting rid of the bacteria in 18 cases (all attempted) which remained as carriers after repeated swabbing of the surface. Squeezing the tonsils and forcing out the exudate often existing in the form of plugs from the crypts has been tried with some success by Kretschmer[*] who succeeded in freeing 13 patients from the carrier condition in which the more simple measures failed.

2. *Spraying with a Living Culture of Staphylococci.* In December 1909 Schiotz[†] a Danish physician described a method of freeing throats from diphtheria bacilli, which seems destined to be a procedure of very common use. It has proved successful in a considerable number of cases in which other measures failed and so far, no unfavorable results have been reported. Schiotz inoculated the throat with a pure culture of staphylococci. He obtained his suggestion from the fact that a person with a staphylococcic sore-throat placed in a diphtheria ward under a mistaken diagnosis did not contract diphtheria. He also found that the germs disappeared from several patients in whom after recovery from diphtheria, the specific bacilli persisted for some time, on the development of an ordinary staphylococcic sore throat. He reports the treatment of six cases with the staphylococcic culture obtained from a throat of a healthy person. The diphtheria bacilli disappeared after one inoculation of the throat of a man who had been detained in the hospital for three months as a diphtheria bacilli carrier, and a woman who had likewise been detained for two months. The other patients who had had diphtheria more recently recovered from the diphtheria condition with equal rapidity after one treatment with staphylococci. During the early part of this year, Page[‡] tested the method with equal success. More recently Catlin, Scott and Day[§] tried the staphylococcic spray on carriers in connection with an epidemic of diphtheria which occurred at the Rockford (Ill.) hospital. Out of a population of 70

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[*] Kretschmer, M.—Zur Bekämpfung der Baxillenpersistenz bei Diphtherierekonvaleszenten, Medizinische Klinki, Berlin. Jan. 15, 1911, VII, No. 3.

[†] Schiotz, A.—Uskadeliggereke af Infektions-baere ved Difteri Ugeskrift for Laeger, Copenhagen, Dec. 16, 1909, No. 50. Abstr. in the Jour. Amer. Med. Assoc., Jan. 29, 1910, Vol. LIV, p. 422.

[‡] Page, H.—Diphtheria Bacillus Carriers, Archives of Internal Medicine, Chicago, Jan. 1911.

[§] Catlin, Scott and Day—Successful Use of the Staphylococcus Spray on Diphtheria Carriers, Jour. Amer. Med. Assoc., Oct. 28, 1911, Vol. LVII, p. 1452.

persons, 17 per cent developed diphtheria and 31 per cent became carriers. In spite of liquid antiseptic treatment, some of them continued to remain as carriers for a long time but the bacilli soon disappeared after the use of the staphylococcic spray. The spray used was a 24 hour-old broth culture of the Staphylococcus pyogenes aureus which had been isolated one year previous from a facial carbuncle and had been grown on agar continuously since. The material was sprayed into the nose and throat two or three times daily. In all cases the bacilli disappeared; in most of them within a day or a few days after the beginning of the treatment.

3. Those who have no Sore Throat may Remain in School until the result of the Bateriological Examination Indicates that They are Diphtheria Carriers. If Such is the Case they Should Remain at Home and be Treated as Mentioned Under (2).

4. If the Epidemic is Extensive Among the Children of a Certain School, Immunizing Doses of Diphtheria Antitoxin may be given to All and the Building may be Advisedly Disinfected With Formaldehyde.

The examination of all children for the diphtheria carrier condition when clinical diphtheria is not present in the community is not recommended since under such conditions the diphtheria bacilli of the few carriers that may be present are ordinarily of little or no virulence.* Nor is the closing of school, when the disease is prevalent, recommended since such makes it more difficult to discover those affected and to control the disease.

The institution of these procedures has put a sudden check to rather severe outbreaks of diphtheria in four cities in Iowa during the past winter, whereas similar outbreaks which occurred previously continued for months. The experience of a number of the larger cities elsewhere has been likewise favorable. We believe, therefore, that the time is now ripe for the Boards of Health of the several states to make appropriate regulations for the finding and controlling of diphtheria carriers in our public schools and similar institutions by the culture method.

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*Slack, Arms, Wade and Blanchard—Diphtheria Bacillus Carriers in the Public Schools, Jour. Amer. Med. Assoc., March 19, 1910, Vol. LIV, pp. 951-954.

THE TREATMENT OF ROOMS AFTER DIPHTHERIA AND SCARLET FEVER.

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Read before the Municipal Health Officer's Section of the American Public Health Association, Washington, D. C., September, 1912.

Today a wide variation exists between the ideas of different sanitarians in regard to the treatment of premises after infectious diseases.

Some fumigate after measles and whooping cough, others consider this unnecessary; some pin their faith to formaldehyde, others to sulphur dioxid and still others to fresh air, sunshine and scrubbing.

For years gaseous fumigation has been carried on after infectious diseases, in former times with sulphur dioxid, although at present formaldehyde is more commonly used.

There are many modes of use of formaldehyde among them being,

1. The volatilization of formalin in a generator.
2. The oxidation of methyl alcohol.
3. The spraying of formalin on sheets and allowing it to evaporate.
4. The use of potassium permanganate.
5. The volatilization of solidified formaldehyde.

The methods of use are too well known to need description and all have their advocates.

By the Boston Board of Health the formalin generator was used until January, 1910, when the potassium permanganate method was adopted to be followed in November of the same year by the use of fumigators containing solidified formaldehyde.

Before changing methods at any time careful investigations were carried on to find the comparative value of these, making all tests under service conditions. It was found in some of the tests—no matter what method was used—that test organisms grew from every exposure yet from none of these cases did secondary cases develop.

From the last of November, 1910, until August, 1912, all fumigations with data were kept by one of the writers, who recorded any subsequent cases from that address together with the elapsed time.

During this time 2675 fumigations were made after diphtheria with 48 "secondary" cases or 1.8% and 1748 fumigations with 27 repeat cases or 1.5 % after scarlet fever.

The following table gives the time between the fumigation and the report of the new case.

TABLE I

	Diphtheria		Scarlet Fever
1–3 days	4		3
4–7 “	15		9
1–2 weeks	8		4
2–3 “	6		2
3–4 “	2		2
Over 4 weeks	13 *		7 **
	* 3–33 days	1–53 days	** 1–30 days
	1–34 “	1–54 “	1–32 “
	1–35 “	1–58 “	1–33 “
	2–37 “		1–40 “
	1–48 “		2–42 “
	2–50 “		1–57 “

Let us first consider the new cases after the fumigations following diphtheria:—four occurred during the first three days and a total of 19 during the first week, of this number 15 were sent to a contagious hospital and the fumigation performed within 48 hours of the time of the report of the case, consequently the new case had the exposure to either the same source of infection or the first case itself within nine days preceding the report of the new case. Therefore it would seem quite probable that contact would be more apt to be the cause of the infection than the room which the patient occupied during the short period between the onset of the disease and his removal. The other four cases followed the release of the patient from quarantine after two successive negative cultures on different days and it is a well-known fact that even this does not absolutely rule out the presence of organisms in the nose or throat. During the 2d, 3d and 4th weeks there were but 16 “repeat” cases and of course exposure has been possible during this time.

Over four weeks there were 13 cases from 33 to 58 days but we doubt very much if many would consider that these were due to infection from the room.

It is the intention of the Board of Health to have cultures of contacts if possible in order to lessen the number of “secondary” cases.

The “secondary” cases after fumigations following scarlet fever occurred as follows: 2 within the first three days, a total of 12 within the first week, 8 during the 2d, 3d and 4th weeks, and 7 over four weeks, a total of 27.

Of the 12 during the first week the room was fumigated within 48 hours of the report of the case in 9 instances on the 3d day in one and after convalescence in the other two. Of the entire number 19 were fumigated within 48 hours of the report of the case, 2 on the 3d day, one on the 10th day and 3 after convalescence.

The number of "secondary" cases is raised by having five children in one family taken as follows: Dec. 4th, 1911, fumigated the same day; December 7th, fumigated the 8th; December 8th, fumigated the 12th; December 15th, fumigated the same day and the last one on the 19th. It seems very reasonable to assume that these infections came from persons rather than from inanimate objects.

In order to demonstrate the fallacy of fumigation the Board has since July 4th, 1911 authorized the use of practically no disinfection after diphtheria and scarlet fever, using for each room, no matter what its size, a fumigator which would disinfect not over 500 cubic feet, and it can readily be seen that when this is used in rooms of from 1000-3000 feet no real disinfection would be accomplished.

The householders were instructed to throughly air the room following the "fumigation" and to wash all woodwork.

The results have borne out the contention that fumigation after these infections was unnecessary, 63% of the secondary cases occurring with the smaller amount of fumigation which comprised 57% of the total number after diphtheria and, if we except the family detailed above, 59% of the secondary cases of scarlet fever after the smaller amount of fumigation comprising 61% of the total number.

If the labor of fumigation after diphtheria and scarlet fever would be dispensed with as it has been in many places after measles, and real disinfection carried on after tuberculosis it seems to the writers that much more good would be accomplished and the public would then realize that it is the individual that is the cause of the spread of the acute infectious diseases in the great majority of cases.

REPORT OF THE COMMITTEE OF THE LABORATORY SECTION OF THE AMERICAN PUBLIC HEALTH ASSOCIATION ON STANDARDIZATION OF DISINFECTANTS.

HISTORICAL:

Pringle in 1750 attempted to arrest putrefactive processes by the addition of various substances. It is interesting to note that the first systematic but rather crude experiments made for the purpose of determining the relative value of the substance used, were conducted in the presence of organic matter.

Buchholtz in 1875 conducted an elaborate series of experiments on various elements in the presence of an infusion of tobacco leaves.

Baxter in 1875 observed that the presence of organic matter required a larger quantity of disinfectant. The test materials which he used were glanders nodules and vaccine lymph.

Jalan De La Croix in 1881 tested the germicidal value of various substances by adding them to beef broth which had been allowed to become contaminated from natural sources.

Robert Koch in 1881 was the first to conduct systematic tests on the germicidal power of disinfectants on pure cultures of bacteria at stated intervals of time. The value of mercuric chloride as a disinfectant and antiseptic was confirmed by his elaborate experiments with anthrax spores dried on silk threads. Koch tested the disinfectants of the time, including carbolic acid and sulphur dioxide. Shortly after the work of Koch emulsified disinfectants made their appearance.

Esmarch in 1887, using Koch's "thread method," found creolin far superior to carbolic acid as a disinfectant againt emulsions of streptococci and vibrio of cholera, but inferior to carbolic acid in the case of anthrax spores.

Henle in 1889, using vibrio of cholera and typhoid bacilli confirmed the work of Esmarch, and, in addition, showed that the greater germicidal power of creolin was due to the higher homologues of phenol, namely cresols.

Fraenkel in 1889, using anthrax spores and the Koch "thread method," showed that the additional germicidal power of crude carbolic over pure carbolic was due to the presence of higher phenols in the former.

Behring in 1890 compared the germicidal values of a number of disinfectants, using the "thread method" and anthrax spores, anthrax bacilli, typhoid bacilli, vibrio of cholera, staphylococci and streptococci as the test organisms.

Geppert during 1889 and 1891 demonstrated that the "thread method" had been overestimated and gave higher results than it should in some cases, due to the carrying over of traces of the disinfectant. This he found in the case of mercuric chloride could be avoided by precipitating the mercuric chloride with ammonium sulphide.

Gruber in 1891 substantiated the claims of Geppert, suggested further dilution and advanced the idea of adding emulsions of bacteria to the disinfectant.

Krönig and Paul in 1897 gave to the scientific world the results of a remarkable series of investigations by a new method known as the "garnet method." They observed that in order to obtain relative germicidal values great care must be taken that such factors as temperature of medication, numbers and species of organisms, media, and absence of extraneous organic matter remain constant. The method consisted in dipping garnets of similar size in an emulsion of anthrax spores. After the films thus obtained had been allowed to dry, the garnets were immersed in the diluted disinfectants. At fixed periods an equal number of garnets were removed from exposure to the disinfectant and washed vigorously in a definite volume of water. When necessary a precipitant was added to prevent antiseptic effects in the sub-culture media. Exact quantities of the wash water were then plated and after incubation the number of surviving spores counted.

This method was the first serious attempt at quantitative germicidal determinations after definite periods of time. Every class of disinfectants was in this way tested under varying conditions and concentrations.

The work of Krönig and Paul marks the beginning of scientific investigation into the fundamental principles of the action of disinfectants as distinguished from the efforts to obtain practical methods for the comparison of values of different disinfectants.

Ikéda in 1897, studying the results of Krönig and Paul, discovered that disinfection of anthrax spores was a gradual one and proceeded according to a definite formula.

Madsen and Nyman in 1907, using the "garnet method" for the further investigation of the progress of the reaction during the killing of anthrax spores by heat, obtained results which in character simulated a monomolecular reaction. In such a reaction the bacteria would be considered as taking the place of one of the reacting substances and the disinfectant the other.

Madsen and Nyman suggested that anthrax spores and mercuric chloride be taken as the standard factors and the action of other disinfectants be tested simultaneously under identical conditions.

Chick in 1908 published her extensive investigation on the laws of disinfection. She concludes that disinfection is analogous to a chemical reaction. In the case of anthrax spores disinfection proceeds as a unimolecular reaction. In the case of vegetative forms there is a departure from the simple reaction due to the difference in resistance among the individual organisms.

She points out that disinfection is influenced by temperatures in accordance with the equation of Arrhenius. When phenol or an emulsified coal tar disinfectant is used, vegetative forms show a definite logarithmic relation between the concentration of disinfectant and the mean reaction velocity of disinfection. In the case of metallic salts, the metallic ion is the real disinfecting agent. Mercuric chloride was thought to form a toxic compound with the bacterial cell, which could be neutralized by an excess of soluble sulphide.

Phelps in 1911 in a preliminary paper elaborates further on the theories regarding the applicability of the laws of physical chemistry to the reactions which take place between the test organisms and the disinfectants.

As the theories regarding the laws of disinfection have not yet been thoroughly mastered and made applicable for the practical testing of disinfectants, it is deemed advisable by your committee to recommend the adoption of a standard method which has been shown by actual use in the hands of a considerable number of competent workers to give reasonably uniform results and to await the presentation of further data which would tend to harmonize the adopted method with the present more or less theoretical hypothesis.

Rideal and Walker in 1903 published their well known "drop method" for the standardization of disinfectants. B. typhosus and pure phenol were chosen as the standard factors. The relative germicidal values of disinfectants were expressed as Rideal-Walker phenol co-efficients.

In England this method has come into very general use, and has supplanted the "thread method" and the "garnet method" for practical purposes because of its greater accuracy and convenience in manipulation.

After the appearance of the Rideal-Walker method there was a decided tendency on the part of certain investigators to question the practical results unless the tests were made in the presence of organic matter.

Firth, Macfadyen and Fowler in 1906 suggested the use of a filtrate from an emulsion of feces. Smith and Prausnitz in 1906 suggested a more severe test in the presence of sputum, strained feces, or feces and urine mixed. Sommerville and Walker in 1906 conducted an elaborate series of experiments introducing various kinds of organic matter. Their experiments with feces gave varying results, due to the irregularity in the composition. In 1907 they suggested standard organic materials in solution such as proteids or gelatines. BLYTH in 1906 worked with organic matter both in solution and suspension. Milk was suggested by him as the standard organic matter.

CHICK AND MARTIN in 1908 published the results of their investigation of the principals involved in the standardization. Among the important modifications of the Rideal-Walker method which they suggested were determination of the co-efficient at the end of 30 minutes, 20°C. as the temperature of medication and the addition of 3% powdered feces to the disinfectant.

Although the introduction of 3% powdered feces doubled the experimental error its introduction was suggested as a means of meeting conditions under which disinfectants are generally used.

THE LANCET COMMISSION in 1909 proposed a modification of the Rideal-Walker method. B. coli and phenol were chosen as the standard factors. The increased number of dilutions, the extension of the time intervals to thirty minutes, the amount of culture and disinfectant transferred to the sub-culture tubes, and the determination of the co-efficient at $2\frac{1}{2}$ minutes and thirty minutes were important modifications suggested by them.

ANDERSON AND MCCLINTIC in 1911 published the results of their extensive work on bacteriological standardization of disinfectants.

The hygienic laboratory phenol co-efficient method which they propose has some of the features of the Rideal-Walker method as well as some of the Lancet Commission method, but also contains independent modifications based upon the results of their studies. In their opinion, the original Rideal-Walker method possessed the following objectionable features:

> First. The latitude allowed in determining the co-efficient.
>
> Second. Lack of definiteness in the proportion of culture added to the disinfectant.
>
> Third. The latitude allowed in the temperature of medication.
>
> Fourth. The use of seeding tubes 5″ by $\frac{5}{8}$″ with cotton plugs which necessitated their removal from the water bath.
>
> Fifth. The possibility of shaking from the sides of the tube organisms that had not been fully exposed to the action of the disinfectant and thus giving erroneous results.

The Lancet method, although considered a distinct advance over the Rideal-Walker method, possessed the following objectionable aspects:

> First. Variations in strains of B. coli communis are known to be greater than those in strains of B. typhosus.
>
> Second. McConkey's bile salt media exerts a variable but none

the less restraining influence on attenuated organisms of the typhoid-colon group.

Third. The method gave no definite rule for decreasing the strength of dilutions tested.

Fourth. Lengthening of the time to thirty minutes appeared to have no very special advantage.

Fifth. The special apparatus required, particularly the spoons, interfered to some extent with the general employment of the method.

After due consideration and investigation of the methods used by the workers mentioned above, your Committee on the Standardization of Disinfectants recommend for adoption as the Standard Methods of this Section, the Hygienic Laboratory phenol co-efficient methods as devised by Doctors Anderson and McClintic and published in Hygienic Laboratory Bulletin No. 82.* The methods there published consist of the original Hygienic Laboratory Phenol Co-efficient Method as first issued by these authors in the Journal of Infectious Diseases, Vol. 8, No. 1. (pages 1–26), in which method no additional organic matter was introduced, and also a modification of this method whereby further definite amounts of organic matter were added. These consist of 1 per cent. of gelatine and 2 per cent. of peptone (pages 27–32). In all instances where the term Hygienic Laboratory Phenol Coefficient Method is used it should be understood that the method employed is the one in which additional organic matter has not been introduced.

The Committee recommend the following elaboration: Under media (page 21 Hygienic Laboratory Bulletin No. 82) instead of the second sentence, insert

"The broth is made as follows:

3 gms. Extract of Beef (Liebig's)
10 " Peptone (Witte)
5 " Sodium Chloride C. P.
1000 c.c. Tap Water.

Boil 30 minutes, make up loss by evaporation, titrate and adjust to + 1.5. Boil 15 minutes, make up loss by evaporation, titrate and adjust if necessary."

Your Committee also desire to make recommendation concerning the question of the cost of a disinfectant per unit of disinfecting efficiency as compared with pure phenol. This subject was presented by Drs. Anderson and McClintic in Bulletin No. 82, Page 32.

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* Bulletin No. 82, Hygienic Laboratory, U. S. Public Health and Marine Hospital Service, Washington, D. C., 1912.

Your Committee desires to recommend the utilization of this procedure, but believes that the method of determining the cost of a disinfectant by its unit of disinfecting efficiency should be applied with a full understanding of the results which will be obtained thereby.

Merck's Silver Label Phenol is recommended in Bulletin No. 82, Page 22, as the standard phenol. It has been found however, that phenols vary in the amounts of cresols and the higher phenols which they may contain.

The following procedure has been used in England for the purpose of eliminating these higher phenols and cresols on the one hand, and any accidental contamination of the phenol with water on the other. While the Committee have no specific data in any amount to warrant the recommendation of this procedure, it would be advisable for those who desire to apply the Hygienic Laboratory Phenol Co-efficient Method under conditions of the greatest refinement to purify the standard phenol in the following manner:

Merck's Silver Label Phenol should be distilled fractionally. The first third which will contain water, is discarded, the last third which may contain cresols and the higher homologues of phenol is discarded and the middle third which should contain neither is used in making up the 5% stock dilution.

Since the publication of Bulletin No. 82 comparisons of the results of tests made by different members of the Committee upon duplicate samples have led to the belief that further studies may develop points of value in the further elaboration of the method which will tend to produce greater uniformity of results in the hands of different workers.

The variability in the resistance of even the same culture when grown under apparently identical conditions appears to be an important factor in any attempted explanation of the different results obtained on duplicate samples.

The variability in resistance may be due to some vital alteration of individual organisms through processes of natural selection or may merely be due to greater or less numbers of the typhoid bacilli present in the standard volumes of culture used in the test.

One member of your Committee has found that the following manipulation of the stock culture gives a test culture of even resistance.

The culture of B. typhosus (Hopkins) is obtained from a 30 day at 20°C. stock culture on standard infusion agar. Transplants are made at intervals of 24 hours in the usual manner. On the third day the culture thus obtained is used and discarded. This method necessitates the transplanting of a new stock culture and three different cultures in extract broth every 24 hours. The temperature of incubation should not vary over .2°C. if concordant results are to be obtained.

One of the members of your Committee also suggests that the following concise systematic procedure be printed as an additional aid to beginners and as illustrating the fact that certain detailed procedures in the application of the method can be subjected to variation without disturbance of the important factors which make for uniformity of results.

CONVENIENT METHOD OF PROCEDURE FOR HYGIENIC LABORATORY PHENOL CO-EFFICIENT METHOD:

DILUTIONS. As most disinfectants used have a co-efficient of 1 or over, it is usually expedient to make a stock dilution of 1 : 100. This is done by adding 1 c.c. of the disinfectant to 99 c.c. of sterile distilled water, or adding 5 c.c. of the disinfectant to 495 c.c. of water. The simplest procedure is to use graduated stoppered cylinders or stoppered flasks with one mark graduations of 100 or 500 c.c. capacities and to partly fill same with sterile distilled water. The disinfectant is then added, using a capacity pipette and washing same out until all of the disinfectant has been transferred to the water and water added to the full capacity called for. This is the stock dilution and is used in making the higher dilutions. In testing disinfectants that have a less co-efficient than 1, a 1 : 20 dilution is used as the stock dilution.

A sufficient number of glass stoppered bottles which have been sterilized with lead foil over the tops are now numbered with a wax pencil to correspond with the numbers which have been placed opposite the dilutions on the list of same which has been prepared at the time of planning the test. Sterile distilled water in flasks, closed with lead foil, is placed conveniently in reach. Delivery pipettes of several sizes which have been sterilized in rectangular copper boxes or bibulous filter paper come next.

The necessary amount of water to make the desired dilutions is now transferred from the flasks of sterile distilled water to the bottles by the use of sterile delivery pipettes and the stock dilution added. (See table for dilutions pages 23, Bulletin No. 82.) If 4 dilutions of phenol are used in the test, the strongest dilution of the disinfectant being tested would be No. 5, as it is considered better to run the phenols first. All of the dilutions are well shaken, and then are ready to be placed in the seeding tubes at the time of starting the test.

ARRANGEMENT OF SUB-CULTURE TUBES. A test tube rack of 6 rows of 12 holes each, or 2 racks, each containing 3 such rows may be used for the sub-cultures. If the test be of 10 dilutions, 60 tubes are numbered in notation and placed in the rack on rows of 10 tubes each; and if the test embraces 12 dilutions 72 tubes of broth are numbered and arranged in rows of 12 each. These are placed within convenient reach of the worker's left hand.

Arrangement of Bunsen Burner. A burner to which a fan tail has been affixed is led preferably from the left and back of the bench to the center and front with a little tubing to spare.

Loop Rack. If made of wood this rack may consist of 4 strips approximately 4 inches wide, so joined that the top shall be about 10 inches high and 9 inches long, and grooved to hold loops at intervals sufficiently large to admit of easily withdrawing the loops. There should be about 6 or 7 grooves. The bottom of the rack should be 2 inches longer than the top to give stability, which will give the sides or ends considerable slant. The rack is placed close to the front of the bench, almost at right angles, with a slight slant to the right and away from the worker, and in front of his right shoulder.

Loops. Loops of 4 mm. inside diameter, 4 in number, which have been bent at the junction of the loop and standing end of the wire at right angles with the latter are placed in the loop rack.

Inoculations. The inoculations are made with an apparatus arranged according to Rosenau's method of measuring minute quantities. A pipette of very small bore, graduated in tenths of a c.c. can be made to deliver six tenths of a cubic centimeter without being too large.

The pipette in its holding apparatus should be placed at the right of the worker, so that he can push the loop rack away from him and draw the inoculator toward him; and, when through inoculating, reverse the action, sliding the inoculator away from him diagonally to the right, and drawing the rack directly toward him.

Water Bath. The water bath consists of a wooden box about a foot and a half square and as deep, containing a three or four gallon pail from which the bale has been removed and packed around with sawdust. It is a good plan to raise the box about six inches more by putting strips and casters upon the bottom. It can then be pushed easily under a bench when not in use, and as easily withdrawn, and is high enough to enable the worker to readily reach the tubes when in use. During the test the water bath is placed at the right of the worker.

Seeding-Tube Holder. A convenient method of making a container for the seeding tubes is as follows: Cut down an oblong wire test tube basket to about 2½ inches in depth and fit the top thereof with a piece of half inch wood, through which three rows of 6 holes each have been bored; the holes being made of a size to fit the seeding tubes loosely.

Adjustment of the Seeding-Tube Holder. An ordinary tripod can be used to support the seeding-tube holder in the water bath. It may be necessary to cut off an inch or two of each leg of the tripod in order to support the seeding-tube holder at the proper depth in the water; that is so that the top is a little above the surface.

CULTURE. A 24 hour culture of B. typhosus, (Hopkin's) is removed from the incubator and filtered into a sterile test tube, using a sterile funnel of suitable size and sterile filter paper. (S. & S. No. 604).

TECHNIQUE. The seeding-tube holder is carried to the place where the dilutions stand waiting, and seeding tubes to the number required are placed therein, being removed for that purpose from a small square wire basket in which they have been sterilized by dry heat; said basket being filled with tubes, closed ends up and then wrapped in paper as a protective measure. 5 c.c. of each dilution is transferred to its numerical seeding tube by the use of sterile 5 c.c delivery pipettes, a separate pipette being used for each dilution. The filtered culture is placed in an unoccupied hole in the seeding tube holder which is placed in the water bath, and the worker takes his place to run the test.

The test is not started until an interval of time sufficient for the culture and disinfectant to reach the same temperature as the water bath (20°C.) has elapsed.

THE TEST:

Flame the loops.
Push Bunsen Burner and Loop Rack directly from you.
With right hand draw up inoculator.
Fill the pipette from the test tube containing the filtered culture.

At the beginning of the 5 or $2\frac{1}{2}$ minute interval (by a timepiece with a second hand which can be arranged to suit the worker) the first seeding tube, which is the one at the left end of the row nearest the worker, is inoculated with 1-10 c.c. of culture and each seeding tube in its numerical order is inoculated, the work being continuous. It is desirable to do the work with the end in view of making the natural break in this part of the work, which is occasioned by the emptying of the pipette and subsequent refilling, as little discordant as possible.

When all of the seeding tubes have been inoculated, the Inoculator is pushed away diagonally to the right, the loop-holder is drawn up to the edge of the bench in the position already described, the timepiece is again consulted and just before the expiration of the $2\frac{1}{2}$ minute interval the loop furthest from the worker is taken in the right hand, the subculture tube numbered "1" is withdrawn with the left hand, the plug of the tube is withdrawn either with third and fourth fingers or with the fourth finger and the palm of the hand, the loop is dipped perpendicularly into the first seeding tube and as the $2\frac{1}{2}$ minutes expire the transfer is consummated; the loop is replaced in the groove next toward him from the nearest loop with one move, the right hand is lowered and put through the rack, the burner taken hold of; the inoculated subculture tube in the left hand is given a rapid shake, replaced, the next one simultaneously withdrawn, and as the worker's eye naturally travels back toward the loop rack the Bunsen is placed accurately under the last used loop and the furthest one selected for the next transfer.

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BOOK REVIEWS.

Principles of Microbiology. *A Treatise on Barteria, Fungi and Protozoa Pathogenic for Domesticated Animals. By Veranus Alva Moore, B. S., M. D., V. M. D. pp. 506+XI. Ithaca, N. Y., Carpenter & Co., 1912.*

The appearance of a volume from the pen of Doctor Moore is sure to be hailed with pleasure by bacteriologists throughout the country who know of his splendid work in the Bureau of Animal Industry and especially as Director of the New York State Veterinary College at Cornell University. This is the second volume to appear in this country bearing the name "Microbiology" and offers additional evidence that the so-called bacteriologist of the present day cannot confine himself to one group of micro-organisms, but must familiarize himself with the broader field which has been opened up during the past ten years.

Professor Moore's book, as indicated in the preface, has been prepared as a text book for his students in veterinary science, and primarily for those beginning the study of Microbiology. Its purpose is to point out the place and role of micro-organism in nature, to give the methods for their study and identification, to indicate the relation of certain species to animal diseases, to describe the more important of these pathogenic species and to show the reactions of the tissues toward the invading organism in the establishment of immunity.

The book may be divided, naturally, into three parts, the first of which, comprising the first eleven chapters, deals with general behavior of the bacteria and the methods for their study and control in the laboratory. The second part comprises chapters XII to XXII and deals with the bacteria and protozoa in relation to disease, particularly the species pathogenic for domestic animals, while the third part of the book takes up the general subject of bacterial products, tissue reactions, the use of sera in diagnosis, immunity and vaccine therapy.

The first section of the book presents a very concise historical sketch of the development of bacteriology, followed by a discussion of the bacteria in nature in which the most important facts are presented. The morphology of the bacteria is next considered and the subject is presented in a very direct and clear manner. One might perhaps question whether in Fig. 2 some of the so-called higher bacteria did not actually belong to the group of Hyphomycetes rather than the Chlamydo-bacteriaceae. Under the classification of bacteria and the identification of the species, specific directions are given for the student and descriptive charts and subdivisions are introduced to make the subject more clear. The descriptive chart of the Society of American Bacteriologists is introduced in full.

Under bacteriological apparatus, the ordinary and many special kinds of appliances are described. The subject of sterilization and disinfection is briefly, but very thoroughly discussed, definitions being supplied for the terms which the student would meet for the first time and careful descriptions of certain disinfectants, their proper uses and their limitations are presented. This makes a chapter of very great practical value. A chapter upon the preparation of media for the cultivation of bacteria gives detailed methods for the preparation of many kinds of culture media which the student or investigator might use, and this with the complete directions for isolation, cultivation and examination of bacteria which follow, make the book of the highest value as a text or reference book for the laboratory. Chapter XI deals with the difficult subject of the vital activities of the bacteria, and the most essential facts are concisely presented. In the discussion of chromogenesis no mention is made, however, of the important work of Sullivan upon this subject. The fundamental subject of fermentation deserves somewhat more detailed discussion than is here accorded it. On notes, also, a little looseness in the description of the properties of ferments and in examples of their action. On page 148 in the reaction expressed between urea and water a typographical error is noted, and on page 152 two other typographical errors, more serious in character, may be pointed out where the author uses the names of Barrie and Stulzer in place of Burri and Stützer and Bacillus radiocola in place of Bacillus radicicola.

In the discussion of formation of gas from sugars, one might also suggest that some consideration be given to the very important work of Longley and Baton which fails to be mentioned here. As is to be expected, the second part of the book, dealing with the relation of micro-organisms to disease, is most excellent. After pointing out the general methods of infection in animals, the author guards the student against the assumption that a microbe pathogenic to one animal must necessarily be pathogenic to another, and under the general head of "Experimental Animals" makes the following statement which it seems to the reviewer is worth quoting here, and should be thoroughly impressed upon every bacteriologist, whether undergraduate or in professional work:

"It is important to keep in mind, however, that because a certain species of bacteria proves fatal to a guinea pig, it cannot be assumed that it is pathogenic for other species of animals. The conclusion cannot be drawn that because one species of animals succumbs to a given organism this organism will prove fatal to other species of animals. Many errors relative to the identity of certain diseases affecting man and the lower animals have been made because of the results of the inoculation of a given animal with the bacteria from different sources have given apparently identical results."

This point is emphasized because of the tendency in certain quarters to depend upon the animal test as a means of proving the dangerous and toxic property of micro-organisms in general.

Bacteria in relation to water and milk supplies are given a brief consideration in this volume. It is rather unfortunate that reference to the report of the Public Health Association Committee on Water Analysis could not have been made to the Report of 1912 rather than to that of 1905, but the later one had presumably not appeared when the book went to press. The importance of milk as a means of transmitting disease is emphasized but it seems to the writer that the importance of the germicidal action of freshly drawn milk is over-estimated and is likely to lead to a false sense of security. If there were actual germicidal action due to milk this should be shown in greater proportion at the higher temperatures than at the low temperatures, which is not the case.

Coming, now, to the more detailed discussion of particular families of bacteria, we find an extensive and most valuable discussion of the Coccaceae and of the Bacteriaceae in their relations to animal diseases. The writer knows of no other treatment so brief and at the same time so clear, concise and comprehensive. The different genera in each of these families is taken up and the species under these genera considered separately with reference to the particular disease caused by it. In each case the synonyms for the organism are given and a description of its place in nature and general occurrence, morphology, staining reactions, methods ot cultivation and life conditions and properties, and a consideration of its pathogenesis. This puts in a very definite way the exact relation existing between specific organisms and specific diseases and gives to the student, or general reader, exact information in place of the vague general statements which are more commonly met. This portion of the book, which if by far more than half of it, is deserving only of the highest praise.

In a similar manner the author discusses the higher bacteria and fungi pathogenic for animals and presents the important determined facts up to the present time.

Coming now to the general subject of the Protozoa, we find a historical sketch of the knowledge of the protozoa with relation to diseases, a discussion of the life cycles of various types of protozoa, methods for their cultivation and their classification. The important species, for which there has been worked out a definite relation to particular diseases, are described in detail, following the same system which is used for the different types of bacteria. By this means, a subject which has been more or less cloudy, because of its rapid development and the mixture of hypotheses with observed facts, is here presented clearly and definitely. Under this general heading of the protozoa are included the Flagellata, Trypanosoma, Spirochaeta, Sarcosporidia and Coccidia. A full account of the Negri bodies is also presented.

A short chapter presents clearly the facts relative to diseases caused presumably by filterable viruses, or in which the germ still remains unknown. Chapter XXIII describes the specific bacterial products of importance in a consideration of serum production, toxine production and reaction upon living organism. The general method for the production of antitoxins is also treated, while Chapter XXIV discusses clearly the subject of the serum diagnosis.

The book ends with a chapter on Immunity and Vaccine Therapy, in which the older theories on immunity are described and the more modern ones explained. Special importance is given to the subject of vaccines and their preparation and use.

The book impresses the reader of its thoroughness, the careful selection and balancing of material and the accuracy of statement and freedom from theorizing.

The makeup of the book is good, typographical or proof-reading errors are few and the type is clear, but a less highly calendered paper would render reading less wearisome to the eyes.

In spite of this and the very insignificant criticisms made as to the first part of the book, the volume constitutes a marked contribution to microbiological science as a whole, and especially in its relation to animal diseases. *S. C. Prescott.*

Milk and the Public Health. *William G. Savage, The MacMillan Co., New York.*

Good milk literature is altogether too meagre. When one contemplates the magnitude of the milk industry and the immense growth of scientific interest and of public interest in the milk question in recent years the scarcity of books on the subject of milk is astonishing. These facts and the present agitation concerning the relation of milk to the public health makes a publication under the above title most timely. W. G. Savage is the Author of a book on the "Bacteriollogical Examination of Water," which is recognized as authoritative. In the present volume he writes with the same style of authority based on long experience as a medical officer of health. He has divided the book into three parts:—

Part 1. The bacteriology of milk: Milk and Human Disease.

Part II. Bacteriological Examination of Milk.

Part III. Public Health Control of the Milk Supply.

In part I the author thoroughly discusses the sources of milk infection and milk born diseases and includes the most recent knowledge regarding bovine tuberculosis and udder inflammation of cattle with a chapter on infant mortality.

Part II is devoted to laboratory tests of milk for bacteria. The value of each of the routine tests is discussed and the standards which have been suggested by all authorities. The author quotes freely from American milk literature.

Part III deals with control of the supply by sanitary inspection and by legal restriction. There is a chapter on Certified Milk and on Pasteurization.

As a whole the book is a most excellent summary of the more recent information on milk matters. It is well worth the price and should find a place on the bookshelf of milk dealers, laboratory workers and health officers.

Charles E. North.

PUBLIC HEALTH NOTES.

Poliomyelitis (Infantile Paralysis).

"Prof. M. J. Rosenau, of Harvard University, announced at a meeting of the Fifteenth International Congress on Hygiene and Demography at Washington, September 26, that he had apparently succeeded in transmitting poliomyelitis (infantile paralysis) from sick to well monkeys by the bite of the common biting fly, *Stomoxys calcitrans*. He allowed a number of these flies to bite monkeys sick with poliomyelitis in various stages of the disease and then later allowed these same flies to bite 12 well monkeys. Of the 12 well monkeys thus bitten 6 became sick with well-marked symptoms of poliomyelitis, and of these, 3 died. Three of the 6 monkeys thus infected had diarrhea and symptoms of enteritis during the course of the illness.

"The *Stomoxys calcitrans* resembles in size and appearance the common house fly. It is most frequently found in and around stables. It is, however, by no means uncommon in houses. It bites animals as well as man, and sucks their blood, upon which it feeds.

"Dr. Rosenau concluded from his experiments that, after the virus of poliomyelitis is taken in to the body of the fly by biting an infected animal or person, some time must elapse before the fly is capable of transmitting the disease, and that the period which must thus elapse is probably less than 21 days."

Public Health Reports, Vol. XXVII, No. 39.

The Outbreak of Poliomyelitis in Buffalo.

"During the week ending August 24, 1912, there were reported by the city health authorities 34 cases of poliomyelitis, with 3 deaths, and the following week, 26 cases with 2 deaths. The total number of deaths up to August 31st numbered 23. The slight decrease in the number of deaths reported gives some ground for the expectation that the epidemic will soon be under control, but it is the opinion of those who are investigating the outbreak that no prediction to this effect is warranted as yet. The commissioner of health of the State of New York reported, August 29th, 9 additional cases in the vicinity of Buffalo, and 6 cases have been reported in the neighboring city of Jamestown."

New York Journal, September 21, 1912.

The Epidemiology of Bacillary Dysentery.

Dr. C. J. Hunt, Associate Chief Medical Inspector of the Pennsylvania Department of Health, has recently reported the results of studies of water-borne bacillary dysentery in that state. After discussing the history of this disease in Pennsylvania, the types and pathogenicity of organisms involved, the season and age at which outbreaks are commonest, and the relation of the disease to typhoid fever, Dr. Hunt expresses his conclusions as follows:—

"1. Bacillary dysentery should always be a reportable disease.

"2. Sufficient power should be given to the health authorities to investigate and abate any suspected source.

"3. Less confusion to the general practitioner results from a nomenclature broad enough to include all types of the causative organism.

"4. While there is some warrant for the terms 'dysentery' and 'paradysentery,' the more general one of 'bacillary dysentery' in so far as preventive medicine is concerned, simplifies the problem both of diagnosis and of sanitary supervision.

"5. There is apparently a notable lack of recognition of the etiology and probably of the pathology of cases infected by members of the dysentery group, resulting in a longer continuance of the infecting source and a higher mortality; this is evidenced in the varied diagnoses such as 'diarrhea,' 'winter cholera,' 'intestinal grip,' 'grip,' 'gastric fever,' 'intestinal disorder' and many others.

"6. Dependent on the casual association of the *B. typhosus*, outbreaks of bacillary dysentery may be followed within ten to twenty-one days by a marked increase in the number of typhoid fever cases. This occurred in five out of nine instances in Pennsylvania and may serve as a warning of the presence of the more serious infection; the immediate abatement of the sources would probably decrease the morbidity and mortality due to typhoid fever.

"7. When it is recalled that the major number of cases of bacillary dysentery are mild in form, being caused by Types 2 and 3; that sporadic cases probably exceed the total numbers occurring in epidemics; that sporadic cases probably account for the large proportion of deaths under 2 years of age accounted for statistically as cholera nostras, dysentery and diarrhea and enteritis; that the disease is reportable in only seven states and territories; and that in the latter the law is not enforced, the only conclusion is that we have no definite collective information about the morbidity and mortality of the infection which properly should be called dysentery."

Journal of the American Medical Association, September 21, 1912.

Bacteria Carried by the Common House Fly.

The part played by flies in the transmission of disease has received experimental investigation during the past summer at Liverpool, England. Flies were caught in specially designed traps in various districts of the city, and in various kinds of shops and dwellings. Some of the flies were then allowed to swim in a sterile fluid for different intervals and the number of bacteria washed off was estimated, while others were pounded up in order to determine their entire bacterial content. Determination of the species of bacteria found was also carried out.

The results of the work, which was carried out under the direction of Dr. E. W. Hope, M. O. H., are summarized as follows:—

"1. The number of bacteria coming from house flies whilst struggling in liquid may be very large, varying from 2,000 (the lowest figure) in five minutes, to 350,000 (the highest figure) in 30 minutes. This number may be taken as a measure of their capacity to pollute liquid with their vomit or excrement, or by wallowing in it. The number of bacteria carried inside the fly is very much greater.

"2. Flies caught in either congested or insanitary areas of the city carry far more bacteria inside and outside than those from the more sanitary, less congested, or suburban areas. The number from the former varied 800,000 to 500,000,000 per fly, and from the latter from 21,000 to 100,000.

"3. The number of intestinal bacteria and bacteria likely to be harmful is larger in flies caught in the insanitary areas.

"4. Flies caught in milk shops apparently carry and contain more bacteria than those from other shops with exposed food in a similar neighbourhood. The reason of this is probably because the milk, when accessible, especially in the summer months, is a suitable medium for bacteria, and the flies first inoculate the milk, and later re-inoculate themselves, and then more of the milk, and so establish a vicious circle.

"5. On one occasion the number of bacteria, carried by house-flies caught in an eating-house opposite the abattoir, was compared with those carried by blue-bottles. The latter, as might be expected, was far larger.

"6. In cities where food is plentiful flies rarely migrate from the localities in which they are bred, and consequently the number of bacteria they carry depends upon the general standard of cleanliness in that locality. This is well indicated by the fact that flies caught in a street of modern, fairly high-class workmen's dwellings, forming a sanitary oasis, in the midst of a slum area carried far less bacteria than those in an adjacent neighbourhood.

"7. As the amount of dirt carried by flies in any particular locality, measured in terms of bacteria, bears a definite relation to the habits of the people and the state of the streets, it demonstrates the necessity of efficient municipal and domestic cleanliness, if the food of the inhabitants is to escape pollution, not only with harmless but also occasionally pathogenic bacteria.

"8. It is clear that flies from the suburbs where infantile diarrhoea is rare carry far less bacteria than those in the city, where it is common. It was, nevertheless, impossible, in the time at our disposal, to correlate exactly the number of varieties of bacteria carried by flies in the city with the number of cases and deaths from infantile diarrhoea in individual streets.

"Dr. Hope states that the full report, with maps, diagrams, etc., will appear in the *Journal of Hygiene.*"

Medical Officer, September 7, 1912.

The Isolation of Scarlet Fever.

"Although the treatment of scarlet fever by isolation in institutions has without doubt had the effect of reducing the death-rate from that disease, there is little or no diminution in its general incidence, a fact which is the cause of much concern among public health administrators. A few years ago there was a strong agitation in favour of the curtailment of hospital isolation in the case of scarlet fever owing chiefly to the practice having been discredited in consequence of the frequency of the number of 'return' cases. Instead, however, of condemning these institutions altogether, medical officers of health and medical superintendents set themselves the task of ascertaining the cause of the prolonged infection which brought about 'return' cases. As a result, it is now very generally recognized that a convalescent patient may become in a sense re-infected from an acute case and that during the last few weeks of the illness such patient should be kept apart from those in the early states of the disease. This view was emphasised by more than one speaker during a discussion of the subject which took place at the Liverpool meeting of the British Medical Association. Dr. C. H. Phillips, who has had a large experience as the medical superintendent of the Bucknall Isolation Hospital of the county of Stoke-on-Trent, insisted that patients should not be massed together in large wards but classified and segregated. Where, he said, the germs of disease are practically living in the respiratory passages and given off by every breath, patients must of necessity infect each other and mild cases become contaminated with severe case and complications of all sorts arise. Each patient should be treated as likely to be dangerous to his neighbour and thoroughly isolated, then mild cases could be more readily discharged from hospital and the cost of maintenance lessened. Dr. Phillips advocated the more general outdoor treatment of cases of scarlet fever. If the patients were warmly clad he considered that the more time they spent in the open air the better it would be for them. We believe that this is becoming more and more the practice among those in charge of fever hospitals, and Dr. Leslie Rundle, of Liverpool, declared that he was in the habit of treating scarlet fever in a similar way to tuberculous cases. Our readers will also remember a recent article in these columns by Dr. Philip Boobbyer, descriptive of the open-air methods of treatment so successfully practised during the last fifteen years at the Nottingham City Fever Hospital."

The Medical Officer, August 31, 1912.

Epidemic of Icterus.

"An interesting report of an epidemic of icterus comes from Elisabethgrad in South Russia. The textbooks pay very little attention to the epidemic character of the disease, and the only good authority on the question is Hennig, who in 1890 collected from the available literature reports from eighty-six epidemics. Dr. S. Weissenberg gives a review, in the *Deutsche, medizinische Wochenschrift* for August 1, 1912, of forty-four cases of icterus which occurred from July 1909, to November, 1910, that is, the epidemic spread over seventeen months, reaching its maximum during the months of October and November, 1909, then falling off, until the same two months of the following year again showed a large increase. From this fact the author concludes that the infectious form of icterus appears only in the fall. As to sex, it was noted that women were more easily attacked than men, and that adults had more cases than children and adolescents. The epidemic was observed not only in the city of about 75,000 inhabitants, but in the surrounding country. Rarely the disease started suddenly, with a slight chill and vomiting and a few hours later icterus developed; usually the patient complained for three days of headache, nausea, and loss of appetite, and icterus appeared between the third and fifth day. Coincident with the appearance of icterus the liver and spleen became painful and sometimes the kidneys were also attacked. Itching of the skin and slowness of pulse which usually accompany icterus were also found in these cases. The temperature only very seldom deviated from the normal. The average period of the attack was about fourteen days, and the attack itself was slight, but tended to recurrence. Only one patient died, but it is doubtful if icterus was the cause."

New York Medical Journal, September 14, 1912.

Trachoma.

"Trachoma has been found by officers of the United States Public Health Service to be prevalent in certain localities in Kentucky and on Indian reservations in Minnesota. Trachoma is a disease affecting the eyes, is chronic in nature, and mutilating in its course and results, frequently producing partial or total blindness. The disease is common in parts of Asia and southern Europe. Immigrants suffering with this disease are not allowed to enter the United States. Recent reports indicate that trachoma is also present in Chile, where it appears to be spreading. Many cases have been noted in Valparaiso. The disease is most prevalent in localities where the hygienic conditions are bad and in those sections of cities where there is marked congestion and overcrowding. The disease has undoubtedly been imported into Chile by immigrants coming from localities where it is endemic."

Public Health Reports, Volume XXVII, No. 37, September 13, 1912.

Deodorizing Sewer Air at Winnipeg.

"The efficiency of the Beeman sewer deodorizing machine has been reported on by Col. H. M. Ruttan, City Engineer of Winnipeg, Canada. In this machine wood alcohol vapor impinges upon a platinized porcelain disk which is maintained at a cherry red heat, the alcohol being oxidized to formaldehyde. Ten machines were installed in Winnipeg in 1910 and in the present report it is set forth that while they are efficient as deodorizers, they have no bactericidal action, (nor is any required), and that the cost of operation is about fifteen cents per machine per day. These machines are installed in sewer manholes, and sufficient formaldehyde is generated to deodorize the gases and vapors arising thereform. Figuring that there should be not less than one deodorizing machine to every three manholes, the International Sanitary Company of Winnipeg has given the city a proposition for eight hundred machines, the total yearly cost of maintenance of which would be approximately thirty thousand dollars. As a matter of fact the city has contracted for fifty additional machines."

Engineering Record, Vol. 66, No. 11, September 14, 1912.

Reporting of Industrial Accidents.

Those interested in the study and prevention of industrial accidents and more particularly in the framing of regulations for the reporting of such accidents may read with much profit the paper of Doctor Robert E. Craddock of Columbia University in the June publication of the American Statistical Association.

The problem Doctor Craddock has set himself is to show what is being done in accident reporting in the various states at present, and to consider how far these present attempts meet the problem and in how far still other facts should be reported.

Among the problems in accident statistics prominence is given to: 1, "Relation of Fatigue to Accident;" 2, "Experience of the Injured;" 3, "Nature and Reduction of the Disability;" 4, "The Mechanical Causes of Accidents and Nature of Injury by Industries;" 5, "Sex, Age and Conjugal Condition of the Injured."

Doctor Craddock emphasizes the need of a greater uniformity in schedules, more complete data, and a uniform scheme of record and presentation.

Quarterly Publication of the American Statistical Association, New Series, No. 98, June, 1912.

Is Dispensary Treatment Effective?

With the increased demand for more efficiency in all lines of industry, it is but natural that a similar movement should begin to have vogue in social work. Michael M. Davis, Jr., recognizes this fact in a recent article on "Efficiency Tests of Out-Patient Work" in the Boston Medical and Surgical Journal. Dr. Davis, who is Director of the Boston Dispensary, has attempted to obtain a basis for ascertaining whether the average clinic really gets value received for the money it spends. He asserts with justice that the oft repeated cry of "abuse" in dispensary treatment can never be verified until accurate statistical investigations among the patients who come to these out-patient departments have been made.

With this idea in mind, Dr. Davis selected 116 patients at random and studied them from the point of view of the latest scientific social methods. Some of the results obtained are of interest. The economic classification showed that 56% of the patients were in the grades of unskilled labor or below; 28% in the skilled labor groups; and 14% in the clerical or professional groups. This factor, however, is not the only criterion of eligibility for dispensary treatment. "The members of the family of a clerk earning $18 a week with six young children may be more suitable subjects for medical charity than an unmarried laborer earning $12", says Dr. Davis.

In the study of housing conditions, it was found that only 16 of the 116 patients were living alone, and that for 30 patients the housing status could not be obtained because of wrong address or for some other reason. Out of 61 patients classified according to persons per room, it was found that in 32 cases there were from 1 to 1½ persons per room; in 11 there were from 1½ to 2; in 3 cases there were 2 or over. In 15 cases there were from ½ to 1 person per room.

In the cases of 93 patients where reasons for coming to the dispensary were ascertained, 33 were "suggested by a friend"; 24 "had relatives who were or had been patients at the dispensary"; 10 had been patients at previous times; 9 were sent by school physician or school nurse; 5 were sent by private physician; 3 "lived close by"; and 4 "had often heard of place."

As to the medical resources of the patients, 41 out of 57 cases in the unskilled labor group had always depended only on medical charity and of the remaining 16, only 3 had ever employed a private physician. In the skilled labor group, out of 37, nearly one-half, 17, had depended only on medical charity and 5 had employed a physician as a frequent resource. In the clerical group, 6 had been continuously unable to employ a physician while the same number had employed one on occasion.

As to the medical results, out of 102 cases where information was obtainable, 61% continued treatment until they were cured, relieved or improved; 33% stopped their visits before completion of treatment; and the remainder either did not improve under continued treatment, or their cases were still pending at the time when the statistics were compiled.

Dr. Davis recommends much more extensive study on this same basis of all dispensaries, and the careful following up in the homes of all cases by the social worker to insure increased efficiency in treatment.

Will Direct Surveys and Exhibits.

The organization of the New Department of Surveys and Exhibits of the Russell Sage Foundation marks a significant advance in social work, and one in which public health workers should be particularly interested. The new department will act as a clearing house for ideas and suggestions on local surveys and also on exhibition campaigns. The detailed plan of action has not yet been fully worked out. In general terms, it will be to define and spread the social survey and exhibit idea and to stimulate its use; to collect and keep within easy reference reach, through pamphlets, reports, photographs, drawings, miniatures and models, information on the best survey and exhibit experience that has been gained thus far; to build up an agency for assisting communities to organize surveys and exhibits; to help in the preliminary diagnosis to determine the major investigations of the survey; to advise in the methods of using exhibits; to help localities to get in touch with material for and directors of exhibits; and to put communities in touch with social surveyors who could be secured to go forward with the studies from the point where the preliminary diagnosis stops. Moreover, with regard to exhibits, it will have a record of cost for services, together with the means toward economy, the places to get materials, where exhibits may be rented, what rental rates are, the cost of photographs, and so on. Another of its functions will be to develop new ways of representing facts that they may be better understood by the many who are not much impressed by statistical tables or who will not translate columns of figures into terms of common experience. The department will not have sufficient funds for sending members of its staff into communities for long periods of time to make surveys or prepare exhibits, but will, to some extent, be able to send representatives for shorter visits to assist in planning and organizing the local projects.

Its director, Shelby M. Harrison, has had wide experience in survey and exhibition work in connection with the Pittsburg Survey and similar movements in Syracuse, Birmingham, the Western Pennsylvania Coal fields and elsewhere. The Associate Director, E. G. Routzahn has for seven years directed one of the traveling exhibits of The National Association for the Study and Prevention of Tuberculosis, and is thoroughly familiar with the technique of exhibition, organization, construction and demonstration. A departmental committee has been organized which will be in close touch with the new work. The members of the committee follow:—Miss Mary E. Richmond, director Charity Organization Department of the Russell Sage Foundation, chairman; Leonard P. Ayres, associate director, Department of Child Hygiene, Russell Sage Foundation; Dr. Livingston Farrand, executive secretary, National Association for the Study and Prevention of Tuberculosis; John M. Glenn, general director, Russell Sage Foundation; Paul U. Kellogg, formerly director, the Pittsburg Survey and Francis H. McLean, general secretary, American Association of Societies for Organizing Charity.

The new department has already issued a pamphlet entitled "The Social Survey" which is of value to anyone engaged in this work. It contains articles by Paul U. Kellogg, Mr. Harrison, Dr. George Thomas Palmer, Miss Pauline Goldmark, and Prof. Edward Chaddock. Office headquarters were opened on October 1 at 31 Union Square, New York City, from which point the department will be glad to co-operate with local and national organizations.

Prevention of Infant Mortality.

The third annual meeting of the American Association for the Study and Prevention of Infant Mortality was held in Cleveland October 2 to 5. The program was divided into the following sections: Birth Registration; Educational Prevention of Infant Mortality; Eugenics; Housing in Relation to Infant Mortality; Midwifery; Nursing and Social Work; and Prevention of Municipal Infant Mortality. Each section of the program was in charge of a selected committee, and the papers were varied and interesting. The exhibit of the association at the recent Congress on Hygiene and Demography at Washington will be used as a traveling exhibit.

Conservation of Health.

Health and disease prevention were given especial attention at the Fourth National Conservation Congress held in Indianapolis, October 1st to 4th. The economic loss from preventable diseases and how this loss might be checked and the resources of the community conserved were discussed by experts from various points of view.

Physical Defects of School Children.

"Of the 20,000,000 children in this country not less than 75 per cent. need attention for physical defects which are prejudicial to health and which are partially or completely remediable." This is the result of the findings of Dr. Thomas Wood, Professor of Physical Education in Teachers' College, Columbia University, and published for free distribution by the United States Bureau of Education. Dr. Wood estimates that at least 15,000,000 school children now in attendance in the schools of the United States need a physician's attention and that of this number 1,000,000 have or have had tuberculosis. Several million of the children have two or more defects of body. Among the principal defects enumerated by Dr. Wood are the following:

From one to two per cent. or 400,000 have organic heart disease; probably five per cent. or 1,000,000 have tuberculosis of the lungs; about five per cent. or 1,000,000 have defective hearing; about twenty-five per cent. or 5,000,000 have defective vision; about twenty-five per cent. or 5,000,000 are suffering from malnutrition; about thirty per cent. or 6,000,000 have enlarged tonsils, adenoids or enlarged cervical glands; and about fifty per cent. or 10,000,000 have defective teeth which are interfering with health.

Against Patent Medicine Reading Notices.

One of the regulations adopted by the Post Office Department under the new law governing newspapers and magazines passed by the last congress, is of significance to the public health movement in that it should have the effect of indicating to the unsophisticated whether certain articles which they are reading concerning alleged "cures" are paid advertisements or simply plain reading matter. The regulation requires:

"That all editorial or other reading matter published in any newspaper, magazine, or periodical for the publication of which money or other valuable consideration is paid, accepted, or promised, shall be plainly marked 'advertisement.' Any editor or publisher printing editoral or other reading matter for which compensation is paid, accepted, or promised, withont so marking the same, shall upon conviction in any court having jurisdiction, be fined not less than fifty dollars ($50) ncr more than five hundred dollars ($500)."

The Lighting of Working Places.

"So much has been expended on securing the cleanliness, the efficient ventilation and a high standard of sanitary equipment in places in which workpeople are employed that the question of adequate lighting runs some risk of being overlooked. Yet it can hardly be disputed that a badly lighted workshop is very likely to be a dirty workshop, and that machinery accidents are less likely to occur where the lighting is not only good but is properly placed. Perhaps, when manufacturers can be convinced of the fact that more machinery accidents occur during the darker winter months of the year and during the latter part of the day than at other times, they will realise that it pays them to provide a sufficiency of light for their workpeople. In an instructive paper read before the International Congress for the prevention of accidents to workmen, held in Milan in May last, Mr. Leon Gaster discussed the value of good illumination as regards health and as a means of preventing accidents. After reviewing the different steps which had been taken in various countries with respect to improving the lighting of working places, he referred in terms of approval to the International Commission on Illumination which has been formed by the Illuminating Engineering Society of London. This Commission is to cover the whole field of illumination. It will deal not only with such questions as photometry, nomenclature, symbols, and the rating of illuminants, etc., but it will also have power to study more practical questions, such as the amount of illumination required in various industrial employments, and in dealing with such it will naturally avail itself of the conclusions reached by expert committees which have considered the hygienic aspects of lighting and which should have great weight in ensuring their being carried into effect in practice.

"Mr. Gaster suggests that factory inspectors should be instructed by the Governments in their respective countries to take particulars of the lighting conditions in the factories they visit as well as the condition of the health of the workers, in order that it may be possible to trace what connection there is between these two conditions. In reporting, he says, on the illumination, inspectors should take note of obvious defects, such as the misplacing of lamps, the use of imperfectly shaded illuminants liable to be prejudicial to vision, and the neglect of adequate lighting for dangerous machinery, etc. In addition, he strongly urges that actual measurements of illumination should be made, as precise data of this kind form a most valuable supplement to personal impressions for future reference. He states that although not yet perfect, instruments for the measurement of illumination have been very much improved, and that the British Home Office have already accumulated a considerable amount of data of this description in various factories."

The Medical Officer, August 31, 1912.

International Congress Proceedings Summarized.

For the convenience of those who attended the International Congress on Hygiene and Demography and also for those who did not attend, the summary of the deliberations of this important gathering as issued by the Publicity Bureau of the Congress, should be of interest. The following theories, conclusions and opinions presented to the Congress are summarized by the Press Bureau. Although they are not in any sense a resumé of the Congress proceedings, they may focus attention on a few points of more popular interest.

The announcement of the discovery of several new micro-organisms including one which should prove of value in the prevention of the bubonic plague. This discovery was announced by Dr. Frederick Novy of the University of Michigan.

A contribution as to the method of infection of the sources of transmission of typhus fever and measles by Drs. Anderson and Goldberger of the United States Public Health Service.

Sir Thomas Oliver of England told the Congress that mine explosions could be reduced through the use of a new chemical which absorbed coal dust, the name of which he did not disclose.

Dr. M. J. Rosenau of Harvard University announced a discovery with regard to transmission of infantile paralysis through the bite of the oridnary stable fly.

Dr. John H. Long of Chicago—Benzoate of soda in food preparations is not harmful, despite the conclusions of Dr. Harvey W. Wiley.

Dr. A. J. Petersen of Sweden—Infantile paralysis is carried from person to person through the secretions of the nose.

Dr. S. Adolphus Knopf of New York—Fully 600,000 school children in the United States have traces of tuberculosis.

Dr. Frederick Zahn of Munich—There must be an economy of woman's energy if the nations of the world are to maintain the high standards set by the age.

Dr. Jacques Bertillon of Paris—Farmers are the most healthy class of humanity, and the liquor dealers the most sickly.

Dr. Lafayette Mendel of Yale—Dwarfs cannot grow, no matter how long the stunted condition has existed.

Dr. Charles V. Chapin of Providence, R. I.—Infection by the air is no longer the chief factor in the spread of infectious diseases.

Dr. C. C. Bliss of New Orleans—Malaria fever parasites can be produced artificially, thus opening the way for the prevention of malaria fever.

Dr. Walter Fornet of the German Army Medical College—Specific yellow fever parasites exist. (Dr. Fornet claimed to have discovered this parasite. American army officers disputed his contention.)

Dr. Francis M. McCrudden of the Rockefeller Institute—Bone is not dead tissue, but is constantly changing, and new bone is being constantly laid down.

Edward Burrell Phelps of New York—Infant mortality throughout the world is on the decrease, despite increased population and birth rate.

Dr. Herbert D. Pease of New York—Oysters in their raw state during non-hibernating periods are not carriers of contagious disease.

Dr. W. L. Moss of Johns Hopkins University—Inoculation of poisons known to be bacilli carriers is entirely impracticable.

Dr. William T. Sedgwick of the Massachusetts Institute of Technology—Contagious diseases are spread through the pollution of railroad beds; therefore there should be laws for regulating their use.

Dr. Charles Gilmore Kerley of New York—Heredity has nothing to do with the character of the child; it is the child's environment which is the determining factor in character building.

Dr. Yandell Henderson of Yale—Soap is the greatest civilizer of mankind.

Dr. L. E. Cofer of the United States Health Service—The Panama Canal will be a meeting place for yellow fever, plague, and contagious diseases from East and West, from North and South America, as well as from Asia.

Dr. John N. Hurty of Indianapolis—Rural communities eat too much fresh meat and bathtubs in farmhouses are as scarce as honest trusts.

Dr. Victor C. Vaughan of Ann Harbor—The non-poisonous tubercle bacillus is an effective vaccine for tuberculosis.

Bleecker Van Wagonen of New York—Ten per cent. of the entire population of the United States are inherently defective and unfit to be parents.

Dr. L. Pierce Clark of New York—Luxury, prosperity, and civilization are leading cases of degeneracy, and must correct themselves.

Dr. W. G. Eversole of Cleveland—Ninety-seven per cent. of public school children have diseased or defective mouths. Decay of the teeth is the most prevalent disease known to modern civilization.

Dr. L. Caozzi of Milan—The average span of life for printers is very low. The highest death rate among them is between the ages of 16 and 35.

Homicide on the Increase.

According to an article by Frederick L. Hoffman in the last number of *The Spectator*, the death rate from homicides in the principal American cities for the last 10 years exceeds that for any other decennial period and considerably exceeds also the death rate from this cause in England and Wales.

Mr. Hoffman's figures indicate a much greater prevalence of homicides in the South than in the North. For instance, as the following table shows, the rate per 100,000 population was 14.7 in southern cities as against 4.3 in eastern cities.

1901-1910.

Cities.	No. of Cities.	Homicides.	Rate per 100,000.
Eastern................	11	3,260	4.3
Central................	7	3,196	7.8
Southern	9	2,699	14.7
Western................	3	517	9.7
All Cities..............	30	9,672	6.9

During the decade 1882–1891, the average death rate from homicides was 5.0 per 100,000 population; in the decade 1892 to 1901, it was 4.9; and in the decade 1902 to 1911 it had increased to 7.2. In the year 1910 and also in 1911, the rate was 8.3. The highest rate was 8.8, in 1907.

Memphis has the highest homicide death rate during the decade 1901 to 1910, the rate being 47.1 per 100,000 population. Charleston, S. C., comes next with a rate of 27.7; Savannah next with a rate of 25.6, and New Orleans next with a rate of 22.2. The lowest rate recorded by Mr. Hoffman was 1.7 in Milwaukee. The New York City rate was 5.1 and that from Brooklyn 4.2, as compared with 8.4 for Chicago.

Comparing American homicide records with those for England and Wales, Mr. Hoffman says:

"This comparison emphasizes the extremely high homicide rate prevailing in the United States at the present time. For males and females the average rate for England and Wales was 0.9 per 100,000 of population, against 4.3 for the registration area of the United States. In other words, there was an excess of 3.78 per cent. in the homicide mortality of the United States over the corresponding homicide record of England and Wales.

"Comparing males only, the rate for England and Wales was 0.9 per 100,000 of population, against 6.5 for the registration area of the United States. The American rate, therefore, was 6.22 per 100,000 in excess of the English rate. For females the English rate was exactly the same as for males, or

0.9 per 100,000 of population, whereas, for the registration area of the United States the female rate was 2.0 per 100,000 of female population.

"The comparison brings out in startling contrast the disregard of human life in the United States at the present time. The subject is obviously one of most serious importance, not only to life insurance companies, but also to the public at large, and, granting the defects in the available statistics, there can be no question of doubt but that the American homicide rate is exceedingly high, and that the rate is on the increase.

Transportation Inspection Plan.

According to recent press dispatches from Washington, the United States Public Health Service is planning to institute an inspection service of various railroads and terminals throughout the country. In order to accomplish this work with the least possible expense, it is planned to commission the various officers of the Public Health Service, when traveling under official orders on trains and vessels engaged in interstate commerce, to make inspections of the sanitary conditions of the trains and vessels on which they are traveling and also of stations, terminals, and wharves at which they stop.

It is intended that the representatives of the Public Health Service making these examinations shall report upon the conditions which they find, and that these reports will later be embodied in a printed statement to be issued in the usual manner. The plan of inspection has been made sufficiently broad so that it will include practically all phases of interstate passenger service.

VOL. II. NOVEMBER 1912 No. 11

AMERICAN
JOURNAL OF PUBLIC HEALTH

COLD STORAGE AND PUBLIC HEALTH[1].

William T. Sedgwick, Sc.D.
Professor of Biology and Public Health, Massachusetts Institute of Technology, Boston.

Delivered before the American Public Health Association, September, 1912, Washington, D. C.

Instead of reading a formal paper, because formal papers are better read than listened to, I want to make an address and to introduce this interesting symposium,—since I have that honor and privilege,—with a few very fundamental considerations.

One is tempted to go into the historical side of the matter and show how, in his own boyhood, when there was no such thing as formal cold storage, meat and milk were hung down in the well, and how, often-times, when spring came, there were very few or no vegetables other than potatoes and cabbages available for the ordinary household. But that is not the subject of my paper. Mine is the more difficult matter of trying to correlate cold storage with public health, and I shall try to stick closely to my text. The reference that I have made, however, shows that before we had cold storage, there was great difficulty in providing suitable food and in keeping that food, especially in temperate climates, which have seasonal changes. Now, at that time, the temptation to keep food too long was very great and the necessity of going without much of the good food that we get today was imperative, so that in the past, without cold storage, the public health was endangered by the temptation to use food that had not been properly kept, and by the lack of sufficient variety at certain seasons. There was also the danger of over-eating of salted foods and we all know how much of the history of scurvy comes along that line. Scurvy was cured in the first instance, you remember, by lime-juice, not by cold storage, but who hears of lime-juice today except in the British Navy, where the men are still familiarly called lime-juicers by the people in other navies and by merchant seamen. Now, under conditions like these came cold storage, and the result is that we may have today at any season, anywhere, fresh food, that is to say, not salted food, and in the greatest possible variety. It is, however, frequently alleged by easy talkers on this subject and by the newspapers that follow on their heels, that a great deal of sickness comes from cold storage food. But remarks of that kind though easy to make, are very difficult to prove. Mr. A. eats a meal containing some cold storage material and he feels bad afterwards. He naturally lays this to the cold storage food. But, ladies and gentlemen, *post hoc* reasoning has always been the bane of the medical profession and I sincerely trust it will never be allowed to become the reproach of the sanitary profession. We want proofs, we want facts, and not suppositions or mere *post hoc* reasoning. I have taken pains to run down a number of alleged cases of poisoning by cold storage food, and not one of them has proved to be of any consequence, such as would enable it to stand in a court of law. I have no doubt that some cold storage food is bad. I have no doubt that some food that has not been in cold storage is bad. I have no doubt that some food is put into cold storage which was bad when it was put in and bad when it came out, possibly a little worse when it came out than it was when it went in, but not much, and so I am very skeptical on this matter of injury to the public health by cold storage. On the contrary, I believe that one of the greatest blessings that ever befell the human race was the discovery of the principle and practice of cold storage. I would even go so far as to say that we could not, today, maintain in any comfort, the great cities that dot the globe, if it were not for this wonderful system of cold storage; and so, as I say, I have yet to discover any appreciable ill effects from cold storage upon the public health, while I can discover any number of blessings to the public health from an abundant dietary, from cheaper food than would otherwise be practicable, and from the substitution of fresh material for material which was spoilt or which was salted.

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[1] Stenographic report.

Now, it is commonly allowed that much of what I am saying is certainly true, but that there are many abuses in connection with cold storage: first, sanitary abuses, which affect the public health, and second, financial abuses, which affect the public purse and indirectly, therefore, the public health. Of course, if bad food is put into cold storage, as I have already said, the cold storage won't improve it any and will probably allow it to deteriorate slowly, meantime; and I believe that instead of taking so much pains about what comes out of cold storage, the proper place for health men to operate is on the placing of things in cold storage. If we could keep out of the cold storage warehouses that food which is just on the edge of spoiling and is put in there only to save it for a little time, we should make a great gain.

We might not save many lives, but at any rate, we should improve the quality of the food output from those warehouses, and I feel strongly that we ought to give more attention than we now do to that end of the subject.

When it comes to the matter of labeling, when it comes to the matter of the length of time in storage, these are technical points that I have no doubt other speakers will touch upon. I have strong feelings and convictions upon them myself, but it is unnecessary to go into them at any length here. I do believe, however, that the time element is comparatively unimportant and that all the attempts, largely political, which have been made to limit the time of storage to three months or six months or nine months, are futile and of little consequence for the public health,—of no consequence to the public health. They may be of some consequence to the public purse, but nature or the season limits these things and the proper basis should be seasonal periodicity. A year is the natural and should be the legal limit in climates like ours, because then the next crop comes into competition with the old crop, and if any limit is needed,—which I do not believe,—then it would be natural and proper to have it the limit nature has set to production. I do not believe that any limit is necessary and my reason is this, that the accumulation of the charges for storage, interest, taxes and all those things, will, in 999 cases out of 1,000, oblige the packer of foods in cold storage to get rid of them, even at a great loss, before the next season's crop comes in. Gambling in food stuffs has always been one of the most dangerous things in the world for the gambler, and gambling in cold storage, in my judgment, is no exception. However, I am wandering away from my subject, which is the influence of cold storage on the public health. I believe,—to sum it all up, and I need not make a long talk, for the subject is very simple,—that, by cold storage today, rightly supervised by boards of health, as it should be, the public health has been and will be immensely promoted. I believe that the public health will also be promoted indirectly through the cheapening of costs. Secretary Wilson, in one of his publications not long ago, said that cold storage was undoubtedly a great benefit to the human race, but it was a question whether it did not increase the cost of food. The facts are, as studied by economists, that in all probability cold storage cheapens the cost of food and in two ways: first, by saving what would have been lost at one season and keeping it over to another, when prices would have been much dearer than if it had not been kept and the supply at the later period increased, and secondly, by encouraging production. Take a farmer in the West, who is producing anything for cold storage or anything which is eligible for cold storage. Suppose there were no cold storage, he must sell forthwith for what he can get. The cold storage warehouses have enlarged his market, and have thus encouraged his production. Do away with cold storage or interfere too much with the time limits, and you cut off the demand, and if you cut off the demand once for even one season, you diminish the supply in the next. If cotton is high this year, the farmers plant more cotton next year. If cotton is low this year, they plant less cotton next year. If fewer things to go into cold storage are demanded this year or if there is no cold storage, the farmers will go out of the raising of those particular things and the supply will be diminished, and it is the supply, in the long run, which regulates prices. Now, if prices get high, the public health suffers, and I, for one, in these days of so much talk about the high cost of living with so much truth in it, am very eager that we, as sanitarians, shall not too much increase prices by unwise or needless propositions in regard to foods and drink for man. It is very easy, by making sanitary requirements too difficult, by hampering the farmer in a thousand ways, it is very easy, I say, to discourage him and lead him to go into some other line of production that diminishes supply and makes prices jump up. When prices rise, the poor get poorer food; and when the poor get poorer food, the public health suffers. And so, Mr. Chairman, without stopping to repeat or strengthen any of these remarks, I may simply recapitulate by affirming, in the first place, that there is, so far as I know, no good evidence that cold storage products are injurious to the public health. Of course, there have been cases, very many cases, of alleged injury, but these injuries were not due, necessarily, to cold storage. They may have been due to the poor quality of the food at the outset,--and cold storage cannot redeem bad food. In the second place, those cases are very few and far between, anyhow. I saw, for example, this winter a statement that a man in a neighboring city to mine had died from eating a cold storage egg. I ran the thing down and found that the man had not died from the egg at all; he had apparently died from pancreatitis, and it was a newspaper exaggeration, pure and simple. I believe, on the contrary, that cold storage has improved the public health and it is capable of still further improving it, immensely improving it. I believe, however, that, like everything of a big sort nowadays, it needs regulation and that the public has a right to know what it is getting and under what conditions. The "rule of reason" applies here as everywhere,—reasonable time limits, reasonable labeling, and especially the safeguarding of food that goes into storage, to see that none but good food goes in; these appear to me to be the main points for proper protection of the public health.

PHYSICS OF REFRIGERATION.

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Read before the American Public Health Association, September, 1912, Washington, D. C.

Feeling in some measure responsible for bringing the importance of refrigeration as an economic, social and health necessity before the Association last year, I propose to allow those who have been especially engaged in illustrating its practical application to occupy most of the time allowed for the symposium.

The rapid and general adoption of refrigeration will have been accomplished whenever we shall have convinced the producer that he can conserve his products to financial advantage, and the consumer, when he realizes that through cold, nature has supplied a means of arresting almost indefinitely the tissue changes which take place in animals and plants in the natural processes of decay common to all organic matter when once deprived of life. Thus Edelmann in his recent work on meat hygiene says "Putrefaction of meat is a bacterial decomposition, which by adequate treatment, curing or preserving may be checked. On the other hand it is above all superinduced by heat and moisture. The last two factors facilitate the growth of putrefaction organisms." There are evidently three principal factors entering into the preservation, unchanged, of the tissues of all products, whether of plant or animal, viz:—

(*a*) Securing the mature, healthy and sound product as free as possible, whether on the surface or in the deep tissues, from microbes of fermentation and putrefaction.

(*b*) The surrounding of the fresh products with pure air which contains always the normal proportion of oxygen, and of a relative humidity at from 65% to 75%.

(*c*) The maintenance of the lowest degree of cold found necessary to best preserve any particular product.

While to the popular mind which only knows of the kitchen refrigerator, the problem seems a simple one, yet daily experience shows, whether at the farm or in slaughter-house, or in the store or butcher shop and later on in the railway car or on shipboard, so many examples of but very partial success or even absolute failure in preserving foods, that the experienced cold storage operator who has made refrigeration an art, knows that here as in all other business, the application of the principles of pure science results in first-class products, and good business returns the same, as when applied in any other industrial concern.

Hence, for a few moments, we may concern ourselves with some of the physical principles involved in the three chief factors already mentioned of the refrigerating process.

Dealing with the first point, that of the quality of the product, to be placed under refrigeration, G. H. Powell, lately of the Bureau of Plant Industries, Washington, has said that 90 per cent. of the success in fruit cold storage depends upon (*a*), the careful picking and packing of mature fruit, which primarily depends upon the proper scraping and spraying of well-pruned trees, grown on rich, well-tilled and well-trained soil.

(*b*) It next depends upon the rapid reduction of the temperature of the picked fruit or killed meat, to a temperature at which the microbes do not readily grow. This means in all cases open handling, that is, fruit in boxes, so that air will readily circulate through the fruit and of carcases hanging separately so that air may reach each part.

The second point, that of surrounding the products with pure normal air of proper relative humidity, of course involves the application of mechanical methods. It will be apparent that while the refrigerating machine, such as the ammonia compressor, performs its work of producing cold by abstracting heat through the evaporating of liquid in pipes, the work of carrying the cold to the cold stores involves the principles of ventilation as applied to the circulation of warm air or the abstraction of foul air. It likewise involves the first essential to good refrigeration, namely, a well-insulated building as little affected as possible by outside heat or cold. In German abattoirs it is laid down as a principle that the air surrounding the carcases, held in cold storage must be changed at least four times in twenty-four hours, which according to the higher outer temperature may demand an amount of refrigeration in warm weather greater even than that required to supply losses through defective wall insulation in the cold storage room itself.

Even though the temperature in the cold storage be so low as to prevent microbic growth, yet experience teaches that volatile organic emanations, whether from meat or fruit, which are highly complex compounds do abstract oxygen from the confined air and do encourage surface fungoid growths and anaërobic action; but the introduction of fresh outer air immediately involves the danger of a saturated air being produced whenever an outer atmosphere of say 80° F. is reduced to say 10° F. in temperature. Fortunately, the solution of the difficulty is easy since the fresh air is drawn by the circulating fan over pipes filled with brine below 32° F. and hence deposits its moisture as frozen vapor on the surface of the pipes. Thence passing on to the cold storage it gradually increases in temperature and so has lessened its relative humidity. But inasmuch as fruits, if in a too dry air, lose moisture and become shrivelled, it is equally essential that an adequate humidity of 70% to 75% be maintained. Manifestly, therefore, in view of the variation in building construction, in the quality of the insulation, in the position of the building as exposed to winds and variations in outer temperature, and equally owing to the varying effectiveness of machinery and the attention given to its operation by the engineer in charge, the maintenance of a proper relative humidity within a small range of internal temperature is a matter of extreme importance, demanding good mechanism and intelligent oversight.

On shipboard and in refrigeration cars thermographs are installed in the cold storage to register the variations in temperature which will indicate also closely the relative humidity; while automatic indicators in the engine-room attached to the thermostats in the various cold storage compartments of buildings, or ships announce to the engineer sitting at his desk variations in temperature not exceeding a degree, and so enable him to lay on more or less cold as the occasion demands. Indeed anyone traveling on ocean liners finds fresh fruit brought to the table at times in a stiff or even frozen condition, which requires a short exposure to a higher temperature in order to place it in the proper condition for eating. It would seem that even citrus fruits are with profit being lowered in their storage temperature from the 40° F., which is set as a standard for transcontinental car transportation.

It is hardly necessary to point out that at temperatures approximating freezing, the relative humidity, if more readily approximating saturation with a slight fall of temperature, does not have the same importance in the matter of favoring fungoid growth as at temperatures above 35°. Extended fruit experiments have shown, however, that the brown fungus spot in the interior of apples may grow at temperatures above 35° without any surface appearances of change in the apple, and would seem to be especially present in certain fruits grown in soils over-irrigated, but are still more influenced by a too humid cold storage atmosphere.

The use of low temperatures in ice cream manufacture and the varying temperatures from 10° to 20° F. for cream mixtures with different flavoring extracts is one of the most interesting and remarkable illustrations of the use of cold in the manufacture and production of foods, and is one quite worthy of a paper devoted to it alone.

I have briefly indicated the requirements of cold storage in their application to the preservation of meats, fruits, etc., and now desire to say a few words about its wider application. Judging from my past experience with persons even well informed in science generally, there exists a very widespread ignorance, not alone of what refrigeration is expected to do, but even more of how it is mechanically produced. In a general way we speak of heat, but do not really realize its physical meaning. We do not think of earth, fruits or carcases holding in their constituent particles a something which by vital action or chemical rays has taken a definite period of time to be stored up, and which will demand an equal amount of transference to a colder body in what we call heat loss, if definite lower temperatures are to be reached. As heat is a form of energy implying molecular movements in the particles of any substance, greater with increasing temperature, so to prevent such active molecular movements we must lower the temperature by the transference of heat through conduction or radiation to some other substance. It is essential that we realize how this is brought about in the ice machine by some gas, for instance, ammonia. The principle of the loss of heat may be thus expressed:—

d. = fall of temperature.
p. = pressure before expansion of gas.
P. = pressure after expansion.
t. = the temperature in degrees at which a compressed gas expands, the pressure being expressed in atmospheres.

The idea is most readily obtained by picturing a receiver or iron drum holding anhydrous liquid, ammonia usually, at a temperature of 90° F., and a pressure of 150 pounds per square inch. Attached to this by iron pipes is a pump operated by belting or electric motor which by exhausting the ammonia in gaseous form lowers the temperature of the air or liquid brine surrounding the pipes. Passing the piston the gases are compressed, thus again having heat produced. Through the cold water of a condenser the gas is passed and so again cooled on its way to the original iron drum, so completing the circuit. The cold thus produced is applied to the surrounding air of the cold storage, either directly through the exhaust pipes placed in the cold chamber, by circulation of air around these pipes placed in a separate room and driven through the cold storage by a fan, or what is still more common by a 15 per cent. calcium chloride brine being cooled in a tank by the ammonia pipes and then circulated through the cold storage rooms by being pumped through iron radiators laid about the ceiling and walls.

It is hardly necessary to say that successful refrigeration involves that goods shall be taken from this cold storage in the pink of condition; hence, this demands that perfectly fresh, matured products shall at the beginning be placed in the cold storage and when so placed given the most skilful treatment possible during their detention there. Being essentially an economic proposition, it means the most careful attention by the engineer in charge of the temperature and relative humidity of the cold storage room, assuring that such be neither too high nor too low. The more delicate the thermometer, the greater the success in maintaining evenness of temperature. Necessarily the item of cost of operation is of prime importance, and hence the engineer must estimate daily the amount of work done by his engine and machine in the degrees of cold or amount of ice produced compared with the fuel consumed or power supplied. The item of a water for condensing purposes, low in temperature and abundant in quantity, is very important in determining daily profit or loss. It is evident that the degree of the temperature of the ammonia in the receiver will determine the difference of temperature between the expansion and compression sides of the pumps, and hence the ratio of efficiency.

But it is only necessary to say in concluding these fragmentary remarks that while the perfection of any product placed in cold storage is a *sine qua non* to highest success, whether hygienic or commercial, yet permanent results must depend upon how economically and yet efficiently the mechanical and physical appliances involved perform their work.

THE BACTERIOLOGY OF FERMENTATION AND PUTREFACTION IN RELATION TO THE CONSERVATION OF FOODS.

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Read before the American Public Health Association, September, 1912, Washington, D. C.

Conservation of foods is in general accomplished by either the destruction or the inhibition of the bacteria which are certain to gain access to them. A consideration of the bacteriology of fermentation and putrefaction in relation to the preservation of foods would, if complete, contain the results of a large number of researches, and a very extensive list of so-called species of bacteria which investigators have described as important in connection with this subject. Since this is manifestly impossible in a short paper, it has seemed to me best to describe at the outset the types of substances available as food and to point out the character of the chemical change which each of these kinds of materials undergoes. In this way we may deal with the microörganisms as groups rather than as species, and the subject becomes less detailed and more easily considered.

Our staple articles of food are of particular value because of the occurrence in them of proteins, carbohydrates or fats which can be transformed by the enzymes of the alimentary tract into energy or matter directly available for the running and repair of the living mechanism. Of these, the proteins are the chief muscle-forming foods, while the other two are more quickly oxidized in the body and the energy is largely transformed into heat rather than modified into the tissue substance. Although we speak of each of these types of foods as an entity, in but few cases do we have any one of them entirely free from one or both of the others, a point which is of some importance in the consideration of questions pertaining to conservation. While especially thought of as food substance for higher animals, all these foods are subject to microbic action, that is, serve as food for the different kinds of germ life. The proteins and carbohydrates are of special importance from the standpoint of food preservation because they are relatively easily attacked or destroyed by microörganisms of different kinds, and especially by the bacteria, with the formation of cleavage products poorer or lacking in food value, depending upon the rate and amount of decomposition, and resulting finally in the total destruction or spoiling of the food. The fats, on the other hand, show considerable stability, at least toward bacterial activity, although they too may undergo decomposition by microörganisms to such an extent as to make them objectionable as food.

All the changes induced in food substances through the activity of bacteria or nearly related organisms may be grouped together under the general name of "fermentation." The term, as thus employed, is a general one, and embraces a large number of specific chemical changes induced by the organisms of different types. The products of these fermentations are very numerous and may be of widely different character. The foods in which carbohydrates predominate are in general acted upon by certain classes of bacteria or by yeasts and moulds with the formation of acids or alcohols as the final products of the fermentation. Along with the acid formation there may also take place the evolution of gases, particularly of carbon dioxide and hydrogen.

The protein-containing foods, on the other hand, are subject to fermentative processes of a widely different type and these processes themselves may be further placed in two groups according as the organisms involved are aërobic or anaërobic in character. Those decompositions of nitrogenous material in which products extremely objectionable in character and of vile odor are frequently formed are generally grouped under the name of "putrefaction" or "putrefactive fermentation." In some instances, particularly with aërobic bacteria, oxidation processes are carried out in which these offensive substances are formed in but small amounts and to these frequently the term "decay" is given, while the stronger term "putrefaction" is reserved for the anaërobic fermentations in which the malodorous products are most conspicuous and the oxidations much less complete. Certain classes of foods, as for example, the edible seeds of plants, which contain both carbohydrates and protein in considerable amount, are subject to both these types of change, the predominant one depending upon the character of the infection and upon the conditions of temperature and air supply. The substances rich in nitrogen and sulphur, that is, the proteins, through the agency of putrefactive bacteria give rise to basic or alkaline end-products, while the foods essentially carbohydrate in character give rise to acids. In both cases the changes go stepwise through a number of intermediate stages, these intermediate products consecutively diminishing in complexity so that, in general, the final cleavage products are mixtures of such simple substances as ammonia, carbon dioxide, sulphuretted hydrogen and mercaptans with amines and still more complex products of putrefaction. Organic acids, of weak types, may also be produced in small amounts and frequently these are at once neutralized by the basic or alkaline products which are likewise formed.

With the carbohydrates, the trend of the reaction is essentially that of hydrolysis, the splitting of sugars or starchy substances into simpler sugars, and the fermentation of these, with or without gas formation, to different acids, particularly lactic, butyric, formic and acetic acids. It may be further noted that proteins of different sources, or different proteins give essentially the same substances on decomposition.

Turning now to the organisms involved in these changes, we find that they may be grouped in a few groups more or less merging into each other and occurring around a few type species. Researches on putrefaction have been carried out for many years. Early investigations were made with mixed cultures of unknown species and their value lies chiefly in indicating the extent to which the decomposition processes may go on rather than for any information obtained as to the character of the inciting organisms themselves. The so-called Bacterium termo, a name which was early given to minute organisms found in decomposing matter, is now known to be of absolutely no value from the taxonomic standpoint. The organisms grouped under this general name were merely of minute size and occurred in putrefying materials, and undoubtedly consisted of many varieties or types of bacteria of small size which happened to occur together.

It was not until the work of Hauser, working with pure cultures, that the bacteriology of protein decomposition began to be elucidated. He discovered, or rather isolated, several kinds of organisms to which he gave the name Proteus, and among these, Proteus vulgaris, or as it is known today, Bacillus vulgaris, was apparently of the greatest importance. This organism is characterized by vigorous motility and marked proteolytic power; and occurs widely in decomposing organic matter. It has no spore formation but seems to possess great chemical activity, affecting a wide variety of substances, not only proteins, but also to some extent sugars, upon which it produces organic acids as well as carbon dioxide and hydrogen. Around this organism as a type form are grouped many others which are similar to it in character, except that they may vary in sugar fermenting power or in the ability to elaborate the same number of enzymes. In most of these, however, the secretion of invertase, rennet, lipase and trypsin takes place. A step further removed, but still nearly related, is a large group of organisms characterized by the power of rapid liquefaction of gelatin and by the formation of green fluorescent products. Best known among these are the organisms Bacillus fluorescens and Bacillus pyocyaneus of which many races or sub-types occur. Furthermore, these are more or less modifiable as to liquefying power and color production, depending upon the character of the food and the temperature at which they develop.

A step farther away are certain organisms of marked chromogenic power, such as Bacillus prodigiosus which, under certain conditions, gives rise to distinct putrefactive changes. The organisms of the hay bacillus type must also be grouped among those which are potentially proteolytic in character and capable of inducing putrefactive change. The organisms of the colon group may also be considered from the standpoint of their power to cause putrefaction. This great group which exceeds all others in the actual number of bacteria in the intestinal tract of warm-blooded animals presents to a more marked degree than the preceding groups the dual personality of being putrefactive and fermentative at the same time. Grown upon media free from carbohydrate and containing albumose or peptone, putrefactive change takes place. On the other hand, if certain carbohydrate foods are present and the temperature is a satisfactory one the fermentative or acid-forming function of the organisms become predominant, acids are produced in liberal amounts, and putrefactive change is checked. We may say, then, that the general result of the development of the colon bacillus and its nearly related species within the alimentary tract is to check intestinal putrefaction and to operate in opposition to the pronouncedly putrefactive types, while on food substances poor or lacking in sugars outside the body, its action is very likely to be putrefactive and destructive especially to secondary protein. Among the cocci, also, various kinds possess the power of inducing both putrefactive and fermentative change, so that a rather ill-defined group of this family, characterized perhaps by its acid-forming power on the one hand and its pathogenic power on the other, must be classed with the putrefactive organisms.

Most important of all the bacteria, from the standpoint of true putrefaction, is the group of anaërobic organisms of which the Bacillus putrificus of Bienstock is the type. To the organisms of this group may be ascribed the most rapid and thorough disintegration of proteins, hence, they may be called the true putrefiers. This organism (B. putrificus), which is anaërobic in character and produces drumstick-shaped spores is, according to Klein, the most important organism concerned in the decomposition of dead animal bodies. It is certainly one of the most vigorous organisms engaged in putrefactive change. Under anaërobic conditions it produces strong tryptic digestion or fermentation, and gives rise to amines as end products of the reaction. Closely related to this are three other strongly anaërobic types, Bacillus perfringens, Bacillus bifermentans sporogenes and Bacillus gracilis putidus. Of these three markedly anaërobic putrefactive types of organisms the last does not ferment sugar while the others prefer the presence of sugars and are able to break them down more or less completely. Undoubtedly here, as in most instances, the presence of large amounts of sugar would have a decidedly restraining action upon the putrefactive functions.

As with the aërobes, collected about these type forms are numerous intermediate or variant species, so that in any organic material undergoing a spontaneous, that is, "natural" putrefaction, the observer might find a great variety of organisms but few of which correspond absolutely to the type species which have been named.

The above mentioned groups of bacteria may be arranged in two great classes. First, the *true* putrefactive bacteria or *those which decompose native protein.* These include (*a*) all strong anaërobic bacilli; (*b*) Bacillus vulgaris; the organisms of the Bacillus fluorescens type; Micrococcus pyogenes; many spore-forming rods, among them soil bacteria especially belonging to the groups of Bacillus mesentericus, Bacillus subtilis, and Bacillus ramosus.

Second, those which decompose protein *cleavage prcducts*, but because of lack of tryptic enzymes cannot break down native protein itself. These affect especially albumoses and peptone, hence are of less importance from conservation standpoint than the first group. Under this heading appear many organisms both of bacillus and coccus forms, some of which are strongly fermentative in character, as, for example, some organisms of the colon and lactic groups, B. prodigiosus, Micrococcus, etc. With a single exception these are all aërobic or facultative forms. In this group we find the connecting links between the characteristically putrefactive and the characteristically fermentative types.

Turning now to the fermentation of foods of plant origin, and especially those rich in starch and sugar, we find a large number of so-called species which may be more or less active. Since the general tendency in this type of fermentation is to produce acids, only those species which can endure considerable acidities will long persist, the others gradually being eliminated as the growth conditions become unfavorable. Here, too, should be mentioned more emphatically the action of sugars in restraining putrefactive change, a phenomenon which has the effect of still further checking the development of the true putrefactive organisms of the first group. Notwithstanding this, the organisms involved in the fermentation of carbohydrates are in certain instances of the same species as those found among the putrefactive groups. This is particularly the case with the second group mentioned above. Bacillus coli and Bacillus aërogenes and their various relatives, the enormously large group of the lactic acid organisms, both aërobic and anaërobic, and many cocci belong to this class. Of the greatest importance here, however, are the lactic acid producing organisms. As regards oxygen, many of these are facultative in character, and they are also capable of growing at either high or moderately low temperatures (ranging from above 50°C. to 0°C.), and give rise to lactic acid alone or to mixtures of lactic, acetic, formic and other acids either with or without gas formation. The character of the substratum determines to some extent the amount of decomposition which may thus take place. By their acidity, substances rich in sugars and starches undergo marked acid fermentation with suitable physical conditions, concentration, temperature, etc., and become not only disagreeable and sour to the taste, but may frequently contain quite high percentages of lactic acid. The rapidity of their action is sometimes startling, a few hours at a favorable temperature sufficing to permit extraordinary chemical changes.

Two distinct types of lactic acid organisms may be recognized, each of which may be markedly destructive to foods; first, those in which the sugar is split directly into lactic acid with no gas formation, as, for example, the true Bacillus acidi lactici group. Second, those in which gaseous products are found as well as the acids, as in the colon and lactis aërogenes group. In this class of carbohydrate fermenting organisms must also be included the butyric acid group which ferments starches and sugars into butyric and acetic acids with the formation of various gaseous products at the same time. This group works for most part anaërobically and consists of a number of different organisms varying slightly in general character but for the most part spore-forming, and capable of developing only within rather limited temperature conditions. Here also should be considered the organisms causative of the rotting of vegetables, mostly of the pseudomonas group. The yeasts and moulds capable of producing alcoholic and allied fermentation also belong in this division.

It has been impossible in the scope of this paper to describe in detail all the organisms which are known to play an important part in food decomposition. The above brief characterization may suffice, however, to show how numerous they are and how manifold is the action which they may induce. Of fundamental importance, when considered from the standpoint of food preservation, is the fact that in spite of their great individual differences in behavior and chemical activity, they all respond to the general law which is observed with all living things in relation to extreme heat and extreme cold. Whether spore-forming or not, short periods of heating at temperatures of 120° C. suffice to destroy all the cells, and continued exposure at temperatures of 0° C. or below suffices to inhibit almost completely all these organisms. This inhibition is, of course, but temporary in many instances, enduring merely as long as the organisms are exposed to the low temperature. When the food substance infected with these organisms is again brought to ordinary temperatures the organisms again spring into activity and begin their destructive chemical work.

THE HYGIENIC AND ECONOMIC RESULTS OF REFRIGERATION IN THE CONSERVATION OF POULTRY AND EGGS.

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Read before the American Public Health Association, September, 1912, Washington, D. C.

Refrigeration, to the laity, is generally synonymous with what is termed "cold storage"; that is, the preservation of perishable products by means of low temperatures continued for thirty days or more. It is on the subject of the application of refrigeration in the form of cold storage that the press of the country has gone quite mad, and concerning which there have been reams of evidence presented to legislators, boards of health, chambers of commerce and investigating committees of one sort and another. From the attention which is being paid to this phase of the application of refrigeration one might infer that if not the only question of importance it is, by far, the most important,—an assumption which, according to the facts, is distinctly erroneous. The most weighty rôle which refrigeration has to play in our economic scheme of things is to assist us in getting perishable products from the producer to the consumer in good order, and for most of these products refrigeration is an essential at every step of the journey.

To illustrate these statements specifically, let us consider the handling of poultry and eggs under modern conditions of scattered and distant production and concentrated consumption. The source of supply of poultry and eggs for the East is steadily moving westward. Forty years ago, New York City received its poultry from its own state and New Jersey; twenty years ago it seldom needed to go beyond Ohio to satisfy its demands. Now it draws the bulk of its supply from the Mississippi and Missouri valleys, and when some unusual scarcity arises it goes even farther afield. For instance, during the severe winter of 1911–12 it sent to California for its *fresh* eggs!

Another potent factor to be considered is that the people in the cities now demand poultry and eggs throughout the year, whereas they used to be almost exclusively seasonal articles. Eggs came in the spring, chickens in the autumn, and turkeys in the winter. The produce men could not get eggs in the wintertime for love nor money, and in the summer they could not prevent their poultry from spoiling—hence, it was either carried alive or not carried at all.

Now the farmer, who used to drive to market with his fresh vegetables, butter, eggs and chickens, is being pushed farther and farther from the cities by the growth of their outlying districts, and he must get his produce to market in some other way. Accordingly, he developed the plan of dressing his poultry on the farm, chilling it with water, packing it in barrels with crushed ice, and sending it by rail to market. Very seldom did he make a specialty of this business. It was just one of the many farm side issues which he might, perchance, do well, but was far more apt to do badly. Then came the reign of poorly handled, half-decomposed poultry and stale, low grade eggs—a condition for which there seemed to be no remedy until mechanical refrigeration became available and the problem of existing conditions, of source of supply and consumptive demand was attacked with breadth of view, scientific accuracy and patience, and the coöperation of the progressive men of the industry to put into practice on a commercial scale the improvements which experimentation suggested.

Such a study of the subject indicates that it is a most complex problem, involving physical, chemical and bacteriological principles. When it began science had but little in the way of pre-gathered, definite results to give us. The best came from the engineers. Our knowledge of the composition of fresh chicken flesh, its permissible variations, its divergence from the normal under varying environments and what conditions were conducive to its stability were all unknown. To study only certain parts of the market history was worse than useless because, taken without due cognizance of the whole, such would be misleading. Therefore, in order to build safely and sanely one must go back to the place and time of slaughter and follow every detail in the packing house, during the railroad haul, in the house of the commission man and the shop of the retailer.

That the methods for the handling of dressed poultry based on mechanical refrigeration and the old procedure where crushed ice was the foundation may be comprehended, let me describe briefly the routine pursued in each case.

The "ice packed" birds killed by some one of the prevailing methods and defeathered by what is termed "dry picking" or "scalding," are thrown into cold water in large tanks or hogsheads. Sometimes running water is used, but generally the tanks are filled when work begins in the morning and it is a very unusual dresser who empties and refills his cooling water more than twice daily. Several hundred chickens, therefore, with dirty feet and bloody heads, are soaked for from one to nine or ten hours in the same water, which becomes very filthy.

Having reduced the animal heat of the chickens to the temperature of the water, some large pieces of ice are thrown into the tank and replenished from time to time until the kill is to be packed, which may be anywhere from twenty-four hours to four or five days. At that time barrels—old or new—good or bad—large or small—have several inches of crushed ice put into them, and on this ice is placed a layer of chickens. Fine ice is packed around and over them and then comes another layer of chickens, and more ice, and so on until the barrel is filled, when a large piece of ice is put on top, sacking or canvas is nailed over the opening and the package leaves for market by freight or express under refrigeration or without it. So much for "ice packing."

When "dry packing" is used the killed, picked fowl is transferred within a few minutes to an insulated mechanically cooled room where the temperature is maintained at 32° F. or a few degrees higher. In about twenty-four hours the temperature of the flesh of the chicken has fallen to that of the room. The feet of the birds are cleaned before they go to the chillroom, and the heads are wiped and wrapped with a firm, non-absorbent paper; hence, when the animal heat is out they are ready to be packed. The package is generally a small box of tasteless wood, holding twelve birds. Almost invariably these packages are loaded in 10,000- or 20,000-pound lots in refrigerator cars chilled by a mixture of salt and crushed ice.

At no time during their preparation for market does water touch these chickens. Scrupulous cleanliness must be maintained if the product is to preserve its fine appearance on the market. It is not possible to enter here into the details of manipulation by which that cleanliness is attained; but the all-metal cooling truck, whereon the poultry is hung to chill, which is perfectly sanitary and on which the birds do not touch one another, will serve as an example of the type of apparatus that is being devised and installed in poultry packing houses where dry packing has been adopted. When dry packed poultry reaches the market it is kept until sold in the chillroom of the commission man, and generally hung in the ice box of the retailer while in his possession. The ice packed poultry, on the other hand, must be kept in fine ice, or ice water, until disposed of.

In large Eastern cities poultry seldom reaches the consumer until two weeks after killing, and if the market drags it may be almost three weeks. If dry packing is used, and low temperatures carefully maintained, the maximum flavor and tenderness of the flesh is attained in about eight or ten days. If wet packing is used the flavor is never as good, and the keeping of the flesh is so uncertain that nothing definite can be said about the period of ripening.

The gross differences in the appearance of similar chickens handled according to these two methods may readily be seen. The deeper significance of the invasion of the flesh by bacteria and its alteration by long contact with water will be apparent to the bacteriologist and physiological chemist, respectively. Such data have been obtained in the laboratory studies which have been made in the course of these investigations and are very striking since they coincide with desirability in appearance and quality of flavor, and give definite reasons for the facts which are visible to anyone in any poultry market, provided he be an unprejudiced observer.

Chart 1* represents graphically, as well as numerically, the relative rate of increase in the number of bacteria in dry packed and wet packed poultry, beginning in the packing house twenty-four hours after killing, and continuing through the whole course of marketing—a period of about twenty days. "A" represents dry packed birds; "B" wet packed. The number of bacteria is calculated on the basis of one gram of flesh. The different periods, represented by 0, 1, 2, 3 and 4, correspond with twenty-four hours after killing; the end of a six-day railroad haul to the market; the expiration of a five-day sojourn in the chillroom of the commission house; a four-day period in the ice box of the retailer and an additional three-day period in the same environment to determine what would happen if the market should be badly glutted and sales unduly delayed. The chart is the result of the study of fifty or more shipments from different parts of the country and throughout the entire year. The handling of the birds was excellent.

It is noteworthy that the bacteria in the flesh of the water chilled bird gained a distinct ascendency in the first twenty-four hours, an ascendency which is maintained throughout. It is also noteworthy that, in bacterial content, the wet packed birds are always at least one stage ahead of their dry packed fellows. In other words, their keeping time is just that much shorter.

So far as palatability is concerned the birds from the first wet packed sample were always the best flavored; the dry packed was generally best in the second sample. The last sample of wet packed was seldom a desirable food, and frequently unfit to eat; the dry packed was always edible though it had lost much of its flavor. Invariably, throughout the whole series, the wet packed lacked flavor as compared with the dry packed.

Quite aside from the question of the rate of deterioration in dressed poultry is the economic waste to the community by soaking flesh in water, a waste which is avoided when cold air refrigeration is used. This waste is by no means small when reckoned on the basis of the nation as may be seen by the following statement:

The poultry industry is so enormous that computations on the basis of single chickens are misleading. Therefore, the figures to be submitted are calculated to the usual carlot—that is, 20,000 pounds. On an average chickens consist of about 35 per cent. of lean meat—or 7,000 pounds of edible material in the carload. By the time this reaches the consumer, in

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* This chart was first shown at a meeting of the Missouri Car-lot Shippers, in March, 1912.

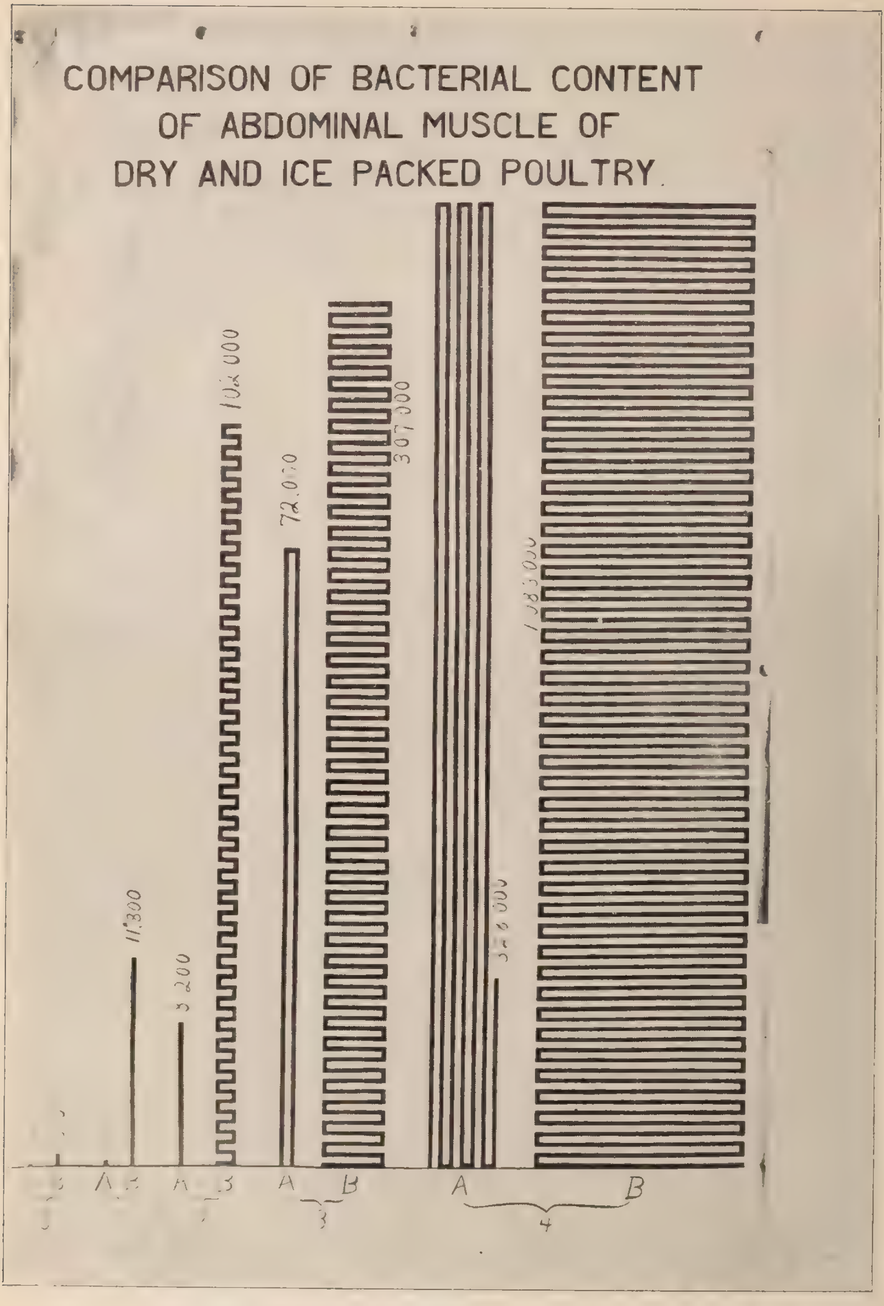
COMPARISON OF BACTERIAL CONTENT
OF ABDOMINAL MUSCLE OF
DRY AND ICE PACKED POULTRY.
11,300
5 200
102 000
72,000
307 000
1 083 000
326 000
B
A
B
A
B
A
B
A
B
3
4

CHART I.

the routine of marketing, it has lost down the sewers about 300 pounds of soluble proteins and nitrogenous extractives. It has also, during that time, absorbed about 1,300 pounds of water, which the consumer buys at chicken prices. Reckoned in money the loss to the community on every carload is at least 450 dollars—but dollars are, after all, the poorest criterion of a loss which consists in the decreased palatability and food value of so universal a product as poultry.

The time is coming—and coming faster than a cursory observation would indicate—when the dirty, watersoaked, half decayed wet packed chicken will be a thing of the past. Indeed, the dry packed chicken of today, generally handled for prompt marketing between 30°–40° F. will be hard frozen twenty-four hours after killing and so shipped to market and so carried, even to the kitchen of the housewife, who will thaw it in her own refrigerator before preparing it for the table. Some of the more progressive packers are refusing to ship dressed poultry in warm weather unless the customer will take it hard frozen. Very soon the customer dealing with the packer prefers it so, but he is handicapped because the consumer insists that it is "cold storage" and demands "a farmer's chicken that is fresh"— and she gets the thawed companion of the frozen bird, which may have deteriorated in the hands of the retailer and will deteriorate every hour that it is in her possession. As usual, ignorance and prejudice conduce to the disadvantage of all concerned.

As we gain a deeper insight into the effect of small variations of temperature on the rate of flesh decomposition the need for low temperatures in the handling of perishable produce and the quick response which a rise of even a few degrees calls forth in the form of undesirable results, impresses one forcibly. Let me illustrate the point in connection with another and very important phase of the application of refrigeration—namely, transportation in refrigerated carriers.

We have in the United States many insulated carriers which can be refrigerated. Most of our food stuffs which travel long distances are hauled in them, with ice in the bunkers in the summer for cold and stoves there in winter to prevent frosting. Let there be a shortage of refrigerated cars in any section which ships a perishable crop and that crop rots at its source. Let the carriers be badly built or poorly managed in transit and the finest produce ever grown reaches the market in bad order. It is not enough that the product shall be well handled at the source of production only; it must be cared for every step of the way to the consumer. It is not a simple matter to determine what happens to the load when the car is closed at the packing house and not opened again until the market is reached, yet thermograph records, and chemical analyses at the time of loading and immediately after unloading are giving us more and more information; and a specific history of the goods before loading and its behavior on the market later helps to fix responsibility. The part which temperature, alone, plays in the keeping of dressed chickens is shown by Chart II.

About fifty shipments of dry packed poultry, averaging a six-day haul and covering a period of two years, were grouped according to the temperature which had prevailed in the refrigerated car, and the analyses giving the amount of loosely bound nitrogen averaged for each group. The base line of the chart represents the average composition of a chicken twenty-four hours after killing and from which the animal heat has been promptly removed by cold air. It will be observed that the change in composition is very small when the temperature is below 30° F.—and that there is no

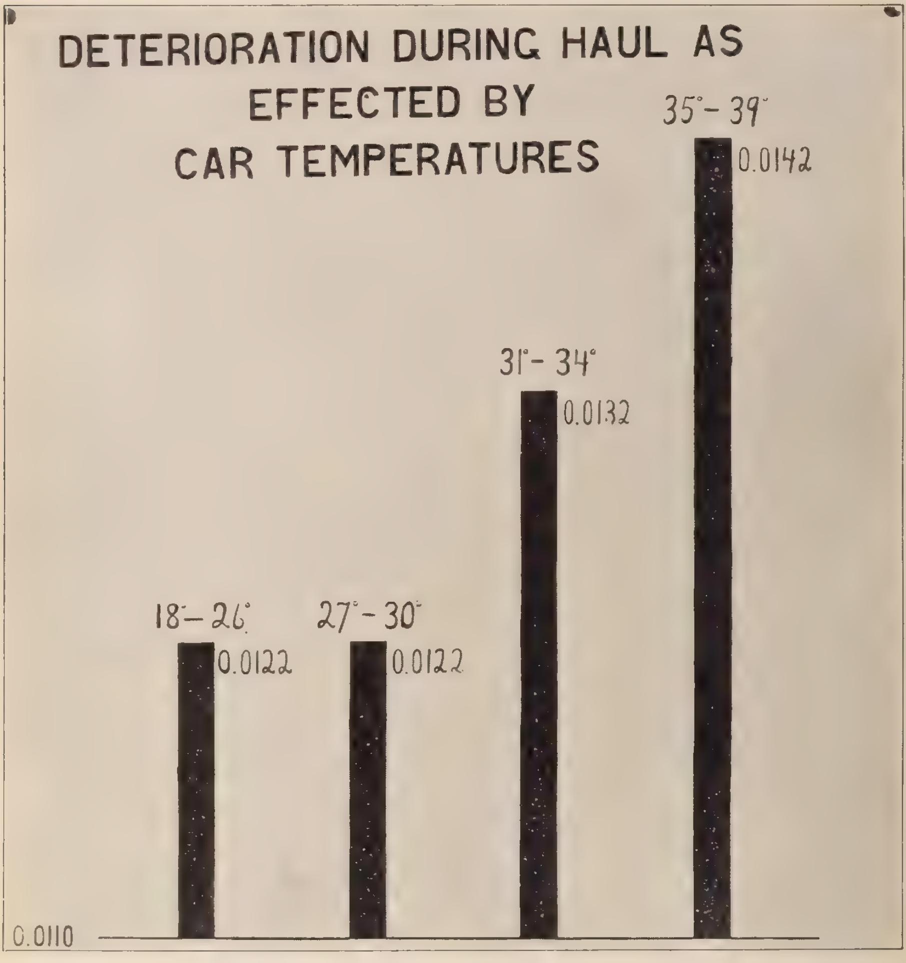

CHART II.

difference, on the average, between 18°–26° F. and 27°–30° F., but both are below freezing. The amount of ammoniacal nitrogen, however, is almost doubled when a rise of 3° takes place; that is, from 31°–34° F.; and again there is a very material increase between 35°–39° F. All these fowls entered the New York market and all of them were liable to be subjected to the same conditions of marketing. Such being the case, a study of that phase showed that the birds arriving in a car where the prevailing temperature was 35°–39° F. were, chemically speaking, just the same age after killing as were the birds hauled at a temperature below 30° F. when they had been on the market for from five to eight days. It is easy to see what such added resistance means to the consumer in gain in condition, and also to the quantity of poultry on the market since there is time to dispose of it before spoilage.

The application of refrigeration to eggs is, from an economic viewpoint, even more important than is its application to dressed poultry, because the egg industry of our country is worth approximately $500,000,000, whereas the poultry industry is worth only $250,000,000; and because eggs have become an almost universal food in homes of rich and poor alike. About ten per cent. of the eggs produced are lost by bad handling before they reach the consumer. A much greater proportion deteriorate in quality and, consequently, in money as well as food value. The destruction begins on the farm with the carelessness of the farmer. It is accentuated in the hot storeroom and by the long holding of the country merchant, and continues while the eggs travel in box cars to the shippers—a few cases at a time—and even beyond him to the city, unless he is provided with mechanical refrigeration and ships under refrigeration. The early spring eggs that reach him before warm weather are almost universally fresh. By applying refrigeration continuously and promptly he can slow deterioration to such an extent that the egg is still edible at the end of nine months.

The eggs which are taken to the shipper during the summer are, almost without exception, lowered in quality by the prevailing temperatures. Even if he has mechanical refrigeration, deterioration having begun cannot be checked as efficiently as it can be prevented. Yet the gain in food quality and the prevention of waste when refrigeration is applied by the shipper to "hot weather" eggs means a greatly increased and bettered egg supply.

Eggs are shipped in a package if uniform size the country over—namely, a case containing thirty dozen. In a well-ventilated chillroom, loosely stacked, the case is chilled through in twenty-four to forty-eight hours to a temperature of about 40° F. A refrigerator car, iced, but not salted, carries the eggs to market at, or about, the same temperature, and deterioration is either greatly retarded, as in the case of hot weather eggs, or practically prevented if the eggs are sent to the shipper before heat or age has attacked them.

Many men are now shipping their unchilled eggs in refrigerated cars,—a step in the right direction, yet some recent experiments have shown that four or five days are required to chill eggs so packed to the temperature prevailing in the car. During this period deterioration is progressing, though more and more slowly. The summer egg, as it comes now to the packing house is, at best, a very unsatisfactory product to ship on long hauls. More and more one finds the packer who is supplied with refrigerated rooms holding back a few carloads of late May or early June eggs to be sent to his clamoring customers in August or September, when the egg supply is the worst of the whole year, and when the highest grade eggs on the market are those "cold stored" in the early spring. Such held eggs are much better than the best so-called "fresh eggs" that the market affords. Indeed, we have traced eggs less than twenty-four hours old, shipped by express in a hot car nineteen hours, and found them lower in quality when they reached the market than fresh eggs shipped for a six-day haul in a refrigerated car.

The scarcity of meat and the high price of protein-rich foods makes it imperative that we handle our egg supply with as little waste and deterioration as possible. Such a need has not been experienced until recently, and the experiments which are now being made looking toward the conservation of eggs are only the beginnings of a campaign of education in which refrigeration and good handling must play the most important parts.

It is the endeavor of the packer to get his dressed poultry and eggs to market without alteration in composition; it is the aim of the carrier to deliver them to the consignee in the same condition in which he received them; up to the present time good handling and refrigeration have come the nearest to fulfilling these fundamental objects. Their era is just beginning. The acquisition of knowledge and its application to the practical problems in a practical way will preserve the quality and conserve the quantity of the national food supply.

HYGIENIC RESULTS OF REFRIGERATION IN THE CONSERVATION OF FISH AND MOLLUSKS.

H. D. Pease, M.D.
New York.

Read before the American Public Health Association, September, 1912, Washington, D.C.

The artificial application of the more modern type of cold storage processes for the preservation of fish for food purposes, occurred when the first inhabitant of the temperate zone, fishing through a hole in the ice with a primitive hook and line, allowed his first catch to freeze on the surface of the ice immediately after he experienced, for the first time, the delights of the amateur angler.

Doubtless other fishermen, before his day, had packed his catch in the available ice in the late fall and early winter and had in this way inaugurated the older system of artificial application of cold for the preservation of fish for food. Thus early did there undoubtedly occur a distinction between the two types of cold storage for the preservation of food. These consist in:

First, the application of degrees of refrigeration which will not accomplish an actual crystallization of the fluid contents of the animal's tissues. Dr. M. E. Pennington has of late been classifying this type of cold storage as "Refrigeration."

Second, the application of degrees of refrigeration to a point where a greater or less degree of crystallization of the fluids of the body takes place, and this artificial process has been recently classified by the same investigator as "Freezer Storage."

It is obviously necessary to consider refrigeration and freezer storage in more or less separate manners, for the reason that the results of the application of these two processes are not identical.

The processes of deterioration which take place in unpreserved food substances, which consist in large part in the growth of various types and forms of bacteria and allied micro- and macro-saprophytes and in the activity of digestive and other internal enzymes or ferments, are, in the processes of *refrigeration*, merely restrained by abstracting from the foods the necessary warmth requisite for the proper growth of bacteria and of other destructive microörganisms and for the activities of the digestive or liquefying enzymes or ferments.

In the case of the *freezer storage* a further process is involved, namely, varying degrees of desiccation, more or less progressive, with the degree of reduction of temperature. It should be understood that there are forms of bacteria and micro-organisms which can grow in food substances at temperatures much below those necessary even for a certain degree of crystallization of the fluid tissue elements, but with the abstraction of moisture from the food substances in the process of crystallization in freezer storage, the bacteria meet the further restraining influence of lack of moisture. A point is undoubtedly reached in connection with every food substance and with the bacteria which are likely to be found in the same, where absolute cessation of growth can be definitely relied upon.

It cannot be said that we are as familiar with the effect of the varying degrees of reduction of temperature upon the lessening of the activity of digestive enzymes found in the various food substances as we are with the effect of reduction of temperature upon bacteria, but it is undoubtedly true that when the degrees of refrigeration have reached the point of beginning desiccation, these enzymes are very materially reduced in activity, and, in most instances, become entirely inactive if the enzyme itself is not destroyed.

Methods of preservation of food and shell-fish through *simple refrigeration* have been in use from pre-historic periods. The practical application of *freezer storage* in the preservation of these types of foods is a matter of very recent development. It is true, however, that for many years fish had been frozen solid immediately after removal from the water and had been maintained in such solid condition for varying periods by individual fishermen and corporations, but the time periods of preservation had, in such instances, been limited in most cases to a few days, and in so far as discussion of the sanitary problems involved is concerned, this older application of freezer storage can be left out of consideration.

It is a rather curious commentary on conditions in this country that the process of refrigeration, *i.e.*, freezer storage, which is the most effective has been the one which has received the most drastic criticisms, and has been subjected to the greater volume of attack, while the least efficient of the two processes, that of refrigeration, has been passed over with practically little or no comment.

It is true that fish in various stages of decomposition have been condemned by inspectors of municipal health departments, on the basis of the tests of the senses, but no comprehensive or systematic inspection of the sanitary aspects of the various branches of the fish industry, as conducted under the simple processes of refrigeration, has ever been inaugurated in any part of this country, so far as it has been possible to determine. It has been shown by Pennington and others, in connection with other food products—especially poultry—that the conditions as to feeding immediately prior to slaughter, the methods of slaughter or of killing, and of preparation for refrigeration, exercise a most important influence, and, to a large extent, determine the sanitary condition of the food products after varying periods of both simple refrigeration and of freezer storage. What has been found to be true by scientific investigation of the poultry industry is in complete harmony with the practical observations which have been made during the past few generations by the individuals engaged in the various branches of the fish industry. It has long been known by them that fish, caught during periods of active feeding, do not keep as well,—other things being equal, as those caught during what might be called the resting or non-feeding stage. It has been known to them that the deep sea fish, feeding on the crustaceæ of the colder waters of the ocean bottoms, are not as likely to undergo as rapid decomposition, other things being equal, as the so-called surface feeders. It has been known to them that in the case of the smaller forms of food fish, the less they are handled and the more rapidly they are frozen after catching, the more easily are they preserved and the better their condition when finally marketed. It has long been known to them that in the case of large fish, which cannot be rapidly and completely frozen, it is more satisfactory to promptly decapitate, bleed and eviserate the fish before refrigerating or freezing.

It cannot be said, however, that the observations of the practical fishermen have extended to a point where all the best possible processes of catching, killing, and preparing for refrigeration have been thoroughly worked out, but they have made sufficient observations to warrant the statement that the *manner of preparation* of the fish for either refrigeration or freezing determines, to a very large extent,—if not absolutely, the result which will be obtained after any given time period from the application of refrigeration, or from complete freezing.

It is astonishing, therefore, that the greatest emphasis should be placed by both a large group of officials empowered to supervise food products of various parts of America and by the general public, on the processes of refrigeration and freezing, rather than upon the processes entirely preparatory to the application of such means of preservation.

The evidences of deterioration in flesh foods can be determined by tests of two general types:

First, the tests of the senses,—that is, as to the macroscopic appearances, the presence or absence of abnormal odors, and the presence or absence of abnormal densities or conditions determined by the tactile sense, and, probably most important of all—especially in instances where the deterioration is slight in quantity, the results obtained by the taste sense after the preparation of the material as an article of food. These have generally been grouped by Doctor Wiley, in his work, under the title of organoleptic tests.

Second, the application of more or less precise technical tests to determine the histological condition of the tissues, the presence or absence and type of the bacterial flora and the presence or absence of abnormal chemical conditions or constituents. Ultimately, various types of feeding experiments can be properly applied, the method varying with the object sought. If for the determination of the existence of decomposed products of a toxic character, the tests are conducted upon animals. If, however, it is desirable to test the nutritive value of foods which may have undergone some alteration or change, then internal tests upon human beings are appropriately employed.

Investigations of the first of the two types mentioned, *i.e.*, the organoleptic tests on fish which have been caught and prepared for preservation under varying conditions, have been extremely limited, except the observations by practical men of the industry, as already stated.

Investigations of the second of the two types mentioned above, *i.e.*, the laboratory and the poison squad tests, on fish which have already been prepared for refrigeration or freezing, or which have actually undergone varying periods of refrigeration or freezing, have likewise been limited in number. I hope to be able to report shortly the details of results of histological and bacteriological studies which have been made under my direction on fresh fish, and fish which have been subjected to various periods of *freezer storage.* The work is still under way. It is sufficient here, however, to report the conclusion which the present state of the work warrants. I have yet to find evidences of any deterioration of a histological or bacteriological character which can be traced to any changes which may possibly have taken place during any time period of freezer storage for a period of twelve months. I am not in a position to express to you definitely the results of chemical investigations which have been made by Prof. W. J. Gies upon fish taken from the same lots, under the same conditions, and on the same dates as the fish which have been supplied to me for the other types of examination. However, in view of the results obtained by me from the bacteriological and histological standpoints, and the chemical results which were obtained by Richardson, from the examination of samples of beef subjected to varying time periods of freezer storage, it will be most surprising if changes of a chemical character of any special importance will be found in the case of the freezer storage of fish for periods extending even beyond two years.

From the observations of Richardson, Pennington, and others, and those made under my own supervision, I feel warranted in making the statement that in so far as properly conducted freezer storage is concerned, flesh foods come out of storage in as good sanitary and hygienic condition as they enter it. This conclusion does not include a statement as to possible slight deterioration in nutritive value, for it does not appear to me to be possible, from the results of investigations which have been made up to the present time, to pass judgment on this point. It is generally known and understood that, in the large majority of instances, there is a slight progressive drying effect produced by the continuation of the freezing process. There appears to be, also, some loss of flavor in many instances and with some methods of preparation prior to the application of freezing. In the case of freezer storage of fish especially, reasonably effective means are taken for the prevention of this slight but progressive tendency toward desiccation. The fish are frozen individually, or are placed in pans and are subjected to very low temperatures for a period of twenty-four to forty-eight hours. When slightly frozen, they are dipped into water and there is formed immediately a protective coating of ice, in most instances entirely preventing all opportunities for the evaporation of the tissues while subjected to the freezing storage. Owing to the evaporation from this ice coating, the re-formation of new coats of protective ice must in some instances be resorted to. Fish which have been properly prepared for such treatment, in which the protecting ice coatings have been systematically and thoroughly applied, will, upon subjection to thawing by placing the same in the ordinary refrigerator, assume the characteristics of entirely freshly caught and prepared fish and cannot be distinguished from the same by any organo-leptic tests above mentioned.

In the preparation of fish for freezer storage, it is of course highly desirable that the sanitary conditions surrounding the immediate washing and preparation of the fish for freezing be of the most modern type. The water used for the washing of the fish should be of good sanitary quality. The apparatus and rooms in which the preparations are made should be kept in as good sanitary condition as should be maintained in any establishment for the preparation and handling of perishable food products.

From what has been said, it is appropriate to conclude that aside from the sanitary inspection of the establishments engaged in the preparation for, and the freezing and holding at freezer storage, the important points for consideration rest in the supervision over the branches of the industry which are applied to food fish prior, or subsequent to, the application of cold storage processes. In short, cold storage of fish, as such, presents very few sanitary problems and such as exist can be readily controlled by infrequent inspection of establishments and their processes by well-trained sanitary inspectors. The public should be rapidly brought to the point of appreciating the fact that freezer storage processes are not in the least productive of unhygienic conditions in the foods subjected to them, but that any unhygienic conditions which may develop in foods are the result of carelessness or the application of processes prior or subsequent to the application of freezer storage.

So far, the discussion has been applicable solely to fish and has not covered oysters or shell-fish. In the case of the industries supplying us with oysters, clams and scallops, there has been but little application of freezer storage. However, but small amounts of these types of foods reach the market without undergoing some degree of the form of simple refrigeration. The exceptions which can be noted are the instances in which oysters and clams are sent to market in the shell, but in such cases the time periods during which these foods, kept in natural conditions, will remain good and free from decomposition, are limited.

It can be said in the case of shell-fish, as in the case of fish, that the time during which they will keep, under the best possible conditions of refrigeration, is wholly dependent on the condition of the shell-fish when subjected to such refrigeration processes. Here, again, as in the case of fish, the questions of the conditions of the shell-fish as to active and inactive feeding, time, temperature and manner of washing and preparing for refrigeration, are all important.

Reference has been made to the possible effect of seasonal variations in the condition of fish at the time of catching. Although no considerable amount of investigation has been made into this aspect of the preparation and preservation of fish as food, a very considerable amount of study has been given to the effect of seasonal variation in determining the hygienic qualities of shell-fish, especially oysters.

I am presenting to the Laboratory Section a paper on the hibernation of oysters. The conclusion which I have drawn in that paper is to the effect that oysters removed from waters which are not over 40° F. in temperature are in a state of such complete closure of the shell that any disease-producing or other bacteria in the surrounding waters are entirely excluded from the tissues of the oysters, and that those which have previously gained access have been destroyed. The period of hibernation in the latitude of New York began the second week of November, 1911, and continued until May 1, 1912.

Oysters gathered during this hibernating season contain but small numbers of bacteria and are much more easily handled and distributed through the process of simple refrigeration than they are in the early months of the oyster season, September and October.

In conclusion, I wish to reiterate that from the sanitary standpoint, at least, the problems in the refrigeration or freezer storage of fish and oysters relate almost without exception to the conditions under which the food or oysters have been caught or gathered and prepared for refrigeration, and to the methods of handling these food products after they have been removed from the influences of processes of refrigeration.

COLD STORAGE IN RELATION TO THE FOOD SUPPLY.

H. E. Barnard.
Indiana State Food and Drug Commissioner.

Read before the American Public Health Association, September, 1912, Washington, D. C.

Cold storage is essentially the application of scientific temperature control in the solution of an economic problem, a practice that regulates prices without increasing them and prevents deterioration while eliminating waste.

But to the average consumer there is no hint of conservation in cold storage and little reason for the practice except that born of greed. June butter in January—spring chicken at Christmas, fresh eggs months after they were taken from the nest, summer fruit in winter weather—do these reversals of the season's horn of plenty, this carrying the products of flush markets over the time of scant production, increase the cost of food to the consumer, reduce its value to the producer or in any way injure the masses of the people who by its consumption and in its production find health and wealth?

The world's development has been along the lines of easy and abundant food production and the most progresssive nations have been the best fed. No people living in a hand-to-mouth fashion have lifted themselves above the poverty of their surroundings; no man can be an efficient member of society whose life is an alternate feast and famine. That is why the savage, ignorant of methods for conserving his food supply is still a savage.

The food supply is perishable. Fruits and vegetables are seasonable; that is, for the most part suitable for use only during the months in which they reach maturity. Meats cannot be kept after slaughter except by special treatment; even the cereals deteriorate with age and the store is depleted by vermin. And so we have a season of plenty when food fresh from the fields and orchards glut the markets and later seasons of scarcity when natural causes have destroyed the surplus of earlier months. These seasonal variations in the food supply are also subject to yearly fluctuations, for the abundant crop of one year may be succeeded by the scant crop of another. The fact that foods are perishable makes it necessary, if they are not to be wasted, to supply some adequate means for holding in check the processes of decay which if allowed to operate would make them unfit for use.

Cold storage is the modern way for arresting food spoilage. It is the latest and most successful method of storing the surplus of one season against the want of the next, and of preventing the fluctuation of prices from below the cost of production at harvest to a point beyond the resources of the purse the rest of the year.

It is of especial interest to the health officer, both because of this phase, which, in so far as it affects the available food supply, touches the great problem of nutrition, and because of the general impression that goods held beyond what may be termed a natural period of usefulness are not suitable for food. Whether food deteriorates and to what extent should be understood by him in order that he properly may draft and enforce cold storage laws. During the last few years extensive investigations have been made to determine the deterioration of food in cold storage. The results of these investigations are the more interesting because, in some instances, at least, they upset generally accepted theories. Ever since cold storage has been practiced, cold storage chicken has been viewed with askance by the public, and cold storage food has been held accountable for every unexplained illness.

The flood of ill-designed, crudely drawn bills presented to the lawmakers of the various states during the last few years was without doubt a well-intentioned attempt to meet the demand for a careful regulation of the business of cold storage, both with the idea of protecting the health of the consumer, and in some little-understood way, reducing the cost of living. In effect, however, the passage of many of the bills suggested would have meant the destruction of a most important industry. Yet the value of cold storage is clear to everyone who has given intelligent study to the subject. Even where cold storage facilities are not available, the necessity for them is recognized, and in Canada, at least, the Government, appreciating the need for cold storage plants, has adopted the policy of subsidizing the construction of refrigerating warehouses. A committee appointed by the French Government to study the recent increase in the prices of food stuffs has pointed out that this is in no small measure due to the fact that France has as yet practically no system of holding food stuffs in cold storage. Unfortunately, men who should be thoroughly familiar with the practice of cold storage still appreciate neither its purpose nor its effect. The Commission on Cold Storage appointed by the Governor of Massachusetts to investigate the subject, addressed a circular of inquiry to secretaries of Boards of Health in the different states, asking for opinions or suggestions as to the need of regulation of the industry and the form which it should take. Twenty-one State Boards answered the inquiry and in every instance recorded a belief that legislation for the regulation of cold storage of food and food products is necessary. That the information, however, was not on the whole of great value was shown by the fact that one official recommended restricting the time limit of storage to ten days, another to ninety days, several did not think storage for more than three months desirable. When the information of those we count as sanitary experts is so limited, need we wonder at the fear of cold storage products so long held by the average consumer? Before satisfactory legislation is enacted we must know why we need regulation and what, if any, bounds of restriction are necessary. The business should be regulated by practical laws which do not have for their purpose its destruction and which are intended rather to put a stop to the practice of the storing of food unsuitable for refrigeration, and which has, even before its entry into storage, deteriorated and become unfit for food; and to insure the withdrawal of all goods before thay have been held sufficiently long to undergo such physical change as may render them undesirable for human consumption.

The report of the Massachusetts Commission referred to recognizes in cold storage a fundamental necessity in the distribution of the food supply of the nation. It finds that cold storage enables perishable food products to be brought to market with the least possible deterioration, and that it enables the surplus of one season to be carried over to meet the demand during the season of natural scarcity. In this way, by distributing the seasonal output of perishable food stuffs evenly through the market year, it helps to equalize supply and demand. The price of the food supply to the consumer is not materially influenced by cold storage. It has been argued that the possibility of storing food products against a rising market may lead to speculation on the part of the middleman, and no doubt the facilities offered by cold storage may be abused to manipulate prices. This possibility, however, is more theoretical than actual, because of the enormous practical difficulties in the way of artificially controlling the supply of food. It is impossible to determine in advance, for instance, whether January and February will be relatively warm months as during the winter of 1911, or bitter cold months as during the winter of 1912. In 1911 the warm months brought about a very large production of eggs, and consequently eggs in storage were taken out at a loss to the owners. The possibility of such conditions obtaining acts as a deterrent to the speculator, and all data at hand shows that the manipulation of food prices is not materially increased by the practice of cold storage.

As before suggested there have been many desultory attempts to regulate the cold storage business by legislation. The Federal Government, although it has discussed the enactment of such legislation for several years, has as yet taken no action. Several states, however, have enacted cold storage laws of varying character.

In order to promote uniformity of legislation by the several states, a thing greatly to be desired in all regulative legislation, the National Association of Food Officials in 1911 gave to a committee of its members the task of drafting a model cold storage bill. As chairman of that committee, may I take the opportunity of presenting to you for your consideration, and with the hope that it may develop helpful suggestions, some of the ideas of the committee as manifested in the first draft of its measure. The committee recognizes the need for legislation: first, to protect the public health against the sale of unfit food; second, to prevent cornering of the food supply and consequent unfair prices to the consumer, and third, to insure both to the consumer and the producer the sale of goods properly labeled. The committee defines cold storage as a warehouse for the holding of food products at or below a temperature of 40° Fahrenheit. It holds that a cold storage warehouse is an establishment employing refrigerating machinery or ice for the purpose of refrigeration where food products are stored for thirty days or more at a temperature of 40° Fahrenheit. It assumes that the states have already at hand machinery for the sanitary control of food-producing establishments, and it provides that the operators of cold storage warehouses shall obtain a license from the State Board of Health for conducting the business after a sanitary inspection has shown the warehouse to be in satisfactory condition. In the event the warehouse so licensed becomes unsanitary, it is made the duty of the State Board of Health to revoke the license. The bill provides that a complete record shall be kept of all goods entering storage and that a quarterly report of such facts shall be presented to the State Board of Health.

It is believed that such reports will prevent the cornering of the food supply. It provides that no article of food shall be placed in storage if not sound and in good condition, or unless it has been prepared in accordance with the Pure Food and Sanitary Food Laws.

The committee is unanimous in its belief that cold storage legislation should not antedate pure food and sanitary food legislation, but rather should follow and supplement it. So it is that the draft does not go into detail in the requirement of sanitary conditions, except as an incident to the issuing of the license to do business.

When food is placed in storage the date of entry is plainly marked on the container, and when removed it is again marked. No goods shall be held in cold storage for a longer period than twelve calendar months, except under certain conditions referable to the State Board of Health. It provides that goods which have been in storage must be labeled "Cold Stored" in such manner that the consumer knows when he purchases his eggs, for instance, that they are storage eggs. It provides that the State Board of Health may make all necessary rules and regulations to secure a proper enforcement of the law.

As an evidence of the honest desire of cold storage operators for reasonable legislation, it is worthy of note that the preliminary draft of this bill, except in certain minor points, is acceptable to the cold storage interests.

With the passage of adequate cold storage legislation and the development of a practice of labeling which declares the character of the goods to the purchaser, the idea now held that cold storage is an artifice used by the speculator to force higher prices and a practice which spoils food instead of preserving it will no longer obtain.

And when cold storage is no longer feared, our markets will be widened and the food supply enlarged by the thousands and hundreds of thousands of tons of edible products which now rot on the ground for want of facilities to preserve them to such a time that they can find a profitable market.

American Journal of Public Health

Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. NOVEMBER, 1912. Number 11

$2.00 a year. 20 cents a copy.
Livingston Farrand, M. D., Editor. Selskar M. Gunn, B. S., Managing Editor
Philip P. Jacobs, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

THE ROMANCE OF REFRIGERATION.

Since the days of Archimedes there has been nothing probably in the realm of science possessing more elements of the romantic than the history of the evolution of methods for the conservation of food by means of cold. This history contains several different elements such as primarily, the needs of rapidly growing urban populations, especially in industrial England, with their ever-increasing demands for meat and an ever-decreasing home supply, the varied efforts of amateurs and men of science to discover practical methods for the application of cold to delay the processes of putrefaction so as to make the transportation of foreign meats possible, the financial ruin of many pioneers in the work, especially Thomas Sutcliffe Mort for whom a monument is erected in Sydney, Australia, who in 1861 established the first freezing works in the world, and lastly the ultimate success of such men as Mr. G. F. Swift of Massachusetts, whose first sale of a heifer given him by his father ultimately resulted in the establishment of a meat business with a capital of seventy-five millions, with shops in four hundred cities in four continents, employing 30,000 hands and having transformed into meat in a single day in the seven packing houses 11,875 cattle, 16,355 sheep, and 34,562 hogs.

The experiments of Carré have succeeded, the dreams of Tellier have been more than realized and the very year which saw Swift go West to Chicago was made notable by Queen Victoria pronouncing a 'baron' of beef very good, sent over to England from New York as 'chilled' meat by T. C. Easton & Co. England saw prices from 1851 rise by decades till 1882, when the S. S. *Dunedin* took the first really successful cargo of frozen meat from Australia, from in 1851—4¾d; 1861—6¾d; 1871—8d, and in 1881—8¼d. per pound, while the imports of mutton rose from 1,000,000 lbs. in 1885 to 13,000,000 in 1910.

But we of the American continent require no historical illustrations to make clear what science hs brought about through the art of refrigeration in maintaining an equilibrium in the supply of meats and other animal foods. Both the United States and Canada are beholding a phenomenon in social evolution, since the former in the census year 1910 has seen an urban increase in population in ten years from 30,000,000 to 42,000,000 with but 4,000,000 added to her rural population, while the latter saw in 1911 with 1,700,000 added to her total population in 1901 of 5,250,000, an urban increase of 1,200,000 and a rural of but 500,000. Production in both countries has been overtaken by consumption of food, while year by year sees, through the use of cold in the preservation of limited food supplies, the only known means of preventing for the moment an actual scarcity and famine prices.

The scientific distribution of food supplies so as to maintain an even balance between production and consumption is, today, urgently demanding the most serious attention of statesmen, economists and sociologists; agricultural science, while doing something towards increasing soil productiveness, is still unequal to meeting the crying demand for supplies; mechanical science too, while daily devising new means for lessening the cost of production, has as yet failed to supply the remedy, and, it must with regret be said that, until all these several agencies have solved each its special problem, the very existence of the people of these two great agricultural countries is forcing the science of refrigeration forward by leaps and bounds as the one remaining immediate means of maintaining something like an adequate supply of food, though it be in some articles almost at famine prices, for the 100,000,000 mouths requiring to be fed on the North American continent.

A STEP FORWARD.

The recent announcement of Doctors Anderson and Frost of the Public Health Service to the effect that they have been able to duplicate and confirm Doctor Rosenau's experiments with regard to the transmission of anterior poliomyelitis to monkeys through the bites of the barn fly (stomoxys calcitrans) will be received with enthusiasm.

While the work of these observers does not necessarily indicate that this disease is not transmitted in other ways, as, for example, by contact, it at least gives health authorities some definite information with regard to the taking of steps to prevent the spread of the disease, and it is safe to say that in those communities where the disease exists, or has existed, renewed efforts will be made to do away with breeding places for flies.

In this connection it is interesting to recall the cycle through which the fly question and the ability of flies, notably the common house fly, to transmit disease has passed. Within the last year or two there has been a noticeable tendency on the part of some health officers to discredit, at least in part, the ability of the house fly to carry disease.

The investigations of Rosenau, Anderson and Frost again emphasize the particular necessity for the proper disposal of horse manure in such a way as to prevent fly breeding, both in urban and rural populations.

The American Journal of Public Health extends to Doctor Rosenau and also, of course, to Doctor Richardson and the workers of the State Board of Health of Massachusetts, its warmest congratulations. It seems probable that this discovery will be of great service and benefit to mankind. While not indicating that infantile paralysis will be exterminated, it does furnish us with much needed ammunition to fight this dread disease. Perhaps the application of the principles of prevention indicated by the discovery will go far towards preventing the panic which at times arises in localities where poliomyelitis appears. The mystery of anterior poliomyelitis is in part solved. The work of these investigators is another triumph for that most valuable aid to mankind—animal experimentation.

PUBLICITY AND HEALTH ADMINISTRATION.

That this is an age of publicity is making itself apparent even to the lowes wits of the community. Even the great corporations of the day are waking up to the fact that the "white light of publicity" is not necessarily a disagreeable obligation, but may be made an asset of value. It is an indispensable preliminary of legislation and a necessary accompaniment of effective administrative control.

It is here that many of our Health Departments fail lamentably. It is doubtful if there is any aspect of our state or municipal governments less understood by the public as to aims and methods than the Departments of Health. They are apt to be viewed with suspicion and antagonism by physicians and with apathy and neglect by the laity.

Particularly in the smaller communities failure to act by the authorities is explained by lack of public support. The fault is often found to be that of the Department itself. The public is not taken into its confidence and we see on every hand the discouraging spectacle of the Health Officer plodding slowly behind instead of leading and stimulating his local public opinion. An organized system of publicity should be in operation in every Health Office in the country. The facility with which the atmosphere clears as knowledge appears is often astonishing. Wherever intelligently tried, whether in a great metropolis or in towns of smaller population, the results are always worth while.

THE EFFECTS OF TEMPERATURE AND HUMIDITY ON FATIGUE.

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Read before the Section on Hygiene of Occupations of the Fifteenth International Congress on Hygiene and Demography, Washington, September, 23, 1912.

The physiologist in his fondness for investigating internal mechanisms is prone to overlook the important fact that the living body exists in the midst of a multitude of external conditions. These conditions furnish stimuli to the living tissues, augmenting or diminishing their actions, and such stimuli play an important part in determining the activities and correlations of the internal mechanisms. The organism as a whole in the midst of its environmental conditions must establish for itself at each successive moment a balance in the work of its various parts. If one of the conditions is altered this balance is by so much disturbed. Within limits, and even within wide limits for brief periods, such a disturbance is borne with impunity: a readjustment to the altered situation occurs; a new balance is struck; and no harm results. But if the limits be much or long surpassed the normal adaptation gives place to a pathological state which is detrimental to the organism.

Of the two environmental conditions here in question, the temperature and the humidity of the air, there exists a certain medium range of variation within which the human body is capable of performing its best work. Even when adapted to this optimum it may be subjected for a considerable period of time to a high temperature or a low temperature, to a high humidity or a low humidity, without serious disturbance of its organic balance. One need not be a man of science to realize this truth; one needs not to live outside of our own America, famed for its fitful climate. But prolonged exposure to extremes of these conditions does not conduce to the continuance of a normal physiological state. The effects of a low temperature and a low humidity have not been studied as fully as have those of the opposite extremes, and these two latter have especial significance when they are associated with one another. I propose therefore to confine myself to a discussion of the physiological and pathological relations of the living body when subjected simultaneously to high temperature and high humidity.

We may observe these relations on many of the hot and humid summer days in our American cities. We may observe them when one who is adapted to a temperate climate goes to live in the tropics. They are well illustrated in various industrial occupations, such as mining, baking, laundering, and some varieties of cotton weaving. The effects of exposure to the atmosphere of these situations are many and various. The bodily mechanism for resisting external heat is at once brought into action. The blood vessels of the skin become dilated and charged with blood, the skin becomes heated, and the sweat glands become active. From the skin there occurs a loss of bodily heat by radiation, conduction, convection and the evaporation of perspiration. The loss of heat by these processes, amounting, according to Rubner,* to 95.25 per cent. of the total heat loss, may suffice for a time to keep the bodily temperature at its normal level. In proportion, however, as the temperature of the air approaches or surpasses that of the body and the humidity of the air is sufficient to prevent the evaporation of sweat, loss of bodily heat by the customary channels becomes lessened. Without adequate means for eliminating the heat that is being constantly produced within, the internal temperature rises and a febrile condition results. Such a state is reached the sooner, the more mechanical work is performed and the more heat is thereby produced. Its oncoming is favored also by a lack of movement in the air. With a continuance of the unfavorable environmental conditions a simple rise of internal temperature may pass into a higher fever characteristic of simple heat prostration, or a moderately severe heat stroke with a temperature up to 40.6°C. (105°F.), and finally into the hyperpyrexial or intense form of heat stroke, in which the bodily temperature has been known to rise to the phenomenal height of 47.6°C. (117.8° F.). That the elevation of bodily temperature is the result of an elevation of external temperature and humidity combined has been well shown by various British authorities† whose information is drawn partly from laboratory experiments and partly from observations in mines and factories. Haldane‡ summarizes the results of his observations as follows:

"These experiments proved that in very warm air it is the temperature indicated by the wet-bulb thermometer (not the actual air temperature as shown by the dry-bulb thermometer, nor the amount of moisture in the air, nor the relative humidity) which determines the ill-effects produced. With a wet-bulb temperature exceeding 88° to 90° [F. = 31° to 32°C.] in fairly still air the body temperature begins to rise, even in the case of persons stripped to the waist and doing no work; and when once started this rise continues until symptoms of heat stroke arise, unless the person leaves the warm air. In the case of persons doing muscular work, the rise of body temperature is much more rapid and begins at a much lower wet-bulb temperature. It will, for instance, begin (in persons stripped to the waist) at a wet-bulb temperature of about 80° [F. =26.7°C.] in still air with moderately hard muscular work, so that hard and continuous work is impracticable at wet-bulb temperatures of over 80° in still air. There is no doubt that when ordinary clothes are worn, serious rise of body temperature occurs at a still lower wet-bulb temperature. Soldiers marching in uniform are, for instance, liable to heat stroke at wet-bulb temperatures of under 70° [F. =21°C.]."

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* Rubner; Lehrbuch der Hygiene, 8th Edition, 1907, p. 90.

† Reports of the Departmental Committee on Humidity and Ventilation in Cotton Weaving Sheds, London, 1909 and 1911.

‡ Haldane: Report of the Departmental Committee, etc., Appendix III, p. 218.

A second striking effect of a combined high temperature and high humidity is a disinclination or actual inability to perform active muscular work. Beginning as a mere inertness, accompanied by sleepiness, which may readily be resisted for a time, it may pass into a genuine condition of fatigue, and ultimately into the exhaustion of heat stroke. Haldane* says of the Cornish miners of tin and copper: "They do not . . . seem to be able to do more than a limited amount of work. The leisureliness of all work in the mine is in very striking contrast to what may be observed in any ordinary English colliery of about the same depth." Pembrey,† after studying the effects of warm moist temperatures upon himself, medical students and soldiers, concludes: "The results show definitely that a man is much less efficient in a warm moist atmosphere. . . . A man can do far more work with less fatigue at a low wet-bulb temperature than at a high one." Pembrey and Collis,‡ in speaking of the physiological effects of the warm, moist atmosphere of cotton weaving, say: "The natural tendency is for the nervous system to become less active and for muscular work to be diminished. In a weaving shed, however, the machine sets the pace and the worker must neglect the dictates of his sensations, which are the natural guardians of his health and well-being. . . . It is not surprising, therefore, that at the end of a day's work many of the weavers complain that they have no energy left, have no great desire for food, and need only drink and rest." Boycott§ says of mining in hot moist air: "My observations on miners . . . lead me to conclude that their power of doing work under these circumstances is quite small." Cadman,¶ professor of mining in Birmingham University and late H. M. Inspector of Mines, gives more detailed observations to the effect that from about 25° C. (77° F.) wet-bulb reading, exertion begins to be accompanied by depression, and disinclination to work increases rapidly with an increasing wet-bulb temperature. At 27.8°C. (82°F.) "if clothes be removed and maximum body surface exposed work can be done providing current of air is available." At 29.4°C. (85°F.) "only light work is possible"; and at 35°C.

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* Haldane: Journal of Hygiene, 1905, V, p. 498.

† Pembrey: Report of the Departmental Committee, etc., 1909, Appendix IV, p. 221.

‡ Pembrey and Collis: Second Report of the Departmental Committee, etc., 1911, Appendix III, p. 24.

§ Boycott: Report of the Departmental Committee, etc., 1909, Appendix V, p. 222.

¶ Cadman: Report of the Departmental Committee, etc., 1909, Appendix VIII, p. 225.

(95°F.) "work becomes impossible." Stapff* observed in the construction of the St. Gotthard tunnel that the laborers, working in an atmosphere often completely saturated with moisture and with a temperature rising at times beyond 30°C. (86°F.) as measured by the dry-bulb thermometer, experience not only great discomfort, but indifference, enervation, weariness and exhaustion. These direct statements are supplemented by the testimony of many industrial workers and observers of industrial conditions to the effect that combined high temperature and high humidity cause not only bodily discomfort but lessened power of labor. All who have experienced such conditions cannot fail to agree with such testimony.

But the lessened power of labor under such circumstances may be real or only apparent. The sensations of fatigue which are undoubtedly present may diminish the amount of labor performed; but sensations of fatigue are often misleading and do not necessarily signify the presence of the actual physical basis of fatigue. Unfortunately there seems to have been made no exact comparative studies of the actual amount of labor which the human body is capable of performing under these abnormal conditions. This is but one instance of a lamentable lack of exact information regarding the capabilities of the body under different environmental conditions. This lack can be supplied only when we have devised adequate methods of testing the working powers of the living individual. Patrizi† has indeed shown that human muscles when subjected to localized hot baths, as by the immersion of the arms in hot water, and then stimulated electrically, undergo early fatigue and rapid exhaustion. This result is in harmony with those of Gad and Heymans‡ and others, who find that the excised muscles of frogs become rapidly fatigued when warmed. From all the available evidence therefore it seems probable that the actual physical basis of fatigue is present in a body working in a hot and humid atmosphere. A more detailed analysis of the physical and chemical conditions of such a body confirms this conclusion and, I venture to think, throws considerable light upon this hitherto obscure subject.

When in a hot and humid atmosphere the blood vessels of the skin are dilated and overcharged with blood, the brain and spinal cord among other organs are rendered correspondingly anemic. This is sufficient of itself to account largely for the feeling of weariness, the indifference and apathy toward laboring that are then present. The changed bodily sensations and the general bodily discomfort may also tend toward the same end.§ But if the stage of elevated bodily temperature be reached, the internal conditions are still more radically changed. A febrile state, especially when pronounced and long continued, affords unusually good chemical conditions for the oncoming of fatigue. One of the striking metabolic accompaniments of the fevers that result from bacterial invasion of the living body is an increased excretion of nitrogen, which is derived, as is inferred from the work of various investigators, from an increased destruction of the proteins of the tissues, probably due largely to the direct action of the higher temperature upon them. This abnormal destruction of proteins appears to occur not only in fevers of bacterial origin but in the hyperthermy produced by hot baths and in other ways. Schleich,[*] Formanek,[†] Edsall[‡] and others, have found this to be the case. It was long ago maintained that along with the increased destruction of proteins in fevers there is an incomplete oxidation of intermediate metabolic products. In this connection, it is interesting to recall that Mandel[§] finds purin bases to be increased and uric acid to be decreased in quantity in febrile urine. Furthermore, Geppert,[¶] Minkowski[‖] and Kraus[**] argue from the diminished quantities of carbon dioxide in the blood and from other facts that there occurs an acid intoxication during fevers. Ammonia, indicating also the production of acids, is increased in output.[††] Acetone and even diacetic and oxybutyric acids have frequently been found in febrile urine.[‡‡] While it is still in doubt whether these acetone bodies arise from destroyed proteins or from destroyed fats, the fact of their existence as intermediate metabolic products seems clear.

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* Stapff: Archiv für (Anatomie und) Physiologie, 1879, Supplement Band, p. 91.

† Patrizi: Archives italiennes de biologie, 1893, XIX, p. 105.

‡ Gad und Heymans: Archiv für (Anatomie und) Physiologie, 1890, Supplement Band, p. 59.

§ Hough: American Journal of Public Hygiene, 1910, XX, p. 267.

Whether analogous changes occur in the hyperthermy resulting from exposure to a hot and humid atmosphere has not yet been sufficiently investigated, but it seems altogether probable that in such cases there is at least a great disturbance of metabolism. The theory of auto-intoxication as the essential causative factor in insolation was first suggested by Vincent in 1888.[§§] It was adopted by Van Gieson,[¶¶] Levene,[‖‖] and Lambert[***] in their investigations of sunstroke during the extraordinary occurrence of that disease in the city of New York in the summer of 1896. The symptoms of the disease suggest strongly the presence within the body of an acute poison. Levene found that the blood serum of two patients suffering from the disease, as well as the urine of convalescent patients, was acutely toxic to rabbits; and although he was unable to demonstrate any increased nitrogenous metabolism he came to the conclusion that the symptoms of sunstroke result from an auto-intoxication due to some kind of a pathological decomposition of tissue. Van Gieson described histological changes in the nerve cells of the brain and spinal cord which are closely similar to those produced by various poisons, such as other auto-intoxicants, bacterial toxines, alcohol and lead. Analogous lesions have been observed in either insolation or artificial heating by Goldscheider and Flatau,[*] Marinesco,[†] and Amato.[‡] Various investigators [§] have found that when the temperature of the body has been raised, either experimentally or in insolation, the alkalinity and coagulability of the blood may be diminished. Another fact of significance is the unusually early appearance of rigor mortis and decomposition after death from insolation,[¶] which suggests that an acidity may have developed in the muscles. From these various observational and experimental data it may be inferred, if not with certainty at least with a high degree of probability, that the subjection of a body to an external temperature and humidity sufficient to raise the internal temperature to a pathological degree causes metabolic changes, the nature of which is not yet known but which interfere profoundly with the normal working of internal mechanisms.

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[*] Schleich: Archiv für experimentelle Pathologie und Pharmacologie, 1875, IV, p. 82.

[†] Formanek: Sitzungsber. d. Kais. Akad. d. Wiss. Math. nat. Cl., Wien, 1892, 101, p. 278.

[‡] Edsall: Transactions of the Association of American Physicians, 1909, XXIV, p. 625.

[§] Mandel: American Journal of Physiology, 1904, X, p. 452; 1907, XX, p. 439.

[¶] Geppert: Zeitschrift für klinische Medizin, 1881, II, p. 355.

[‖] Minkowski: Archiv für experimentelle Pathologie und Pharmacologie, 1885, XIX, p. 209.

[**] Kraus: Zeitschrift für Heilkunde, 1889, X, p. 106.

[††] Erben: Zeitschrift für Heilkunde, 1904, V, p. 33.

[‡‡] MacCallum: Archives of Internal Medicine, 1909, II, p. 594. Also Harvey Lectures, 1908–9, p. 27.

[§§] Vincent: L'hyperthermie. Thèse de Bordeaux, 1887–88. Number 8.

[¶¶] Van Gieson: New York State Hospitals Bulletin, 1896, I, p. 475; Medical Record, 1900, LVII, p. 1134.

[‖‖] Levene: New York State Hospitals Bulletin, 1897, II, p. 357.

[***] Lambert: Loomis and Thompson's "A System of Practical Medicine," 1898, article on "Insolation"; Medical News, 1897, LXXI, p. 97.

Fatigue is a physical phenomenon, a lessened power of work, which has as its basis certain metabolic phenomena. The two chemical causes of fatigue have long been recognized as the diminution of substance that is essential to activity and the accumulation of metabolic products that are toxic or depressing to the tissues. Of these fatigue substances carbon dioxide and lactic acid appear to play a prominent rôle in the production of normal fatigue.[||] It is probable, as I have elsewhere maintained,[**] that these are but types of other metabolic substances which act similarly. This is seen most clearly in certain pathological conditions. It is well-known that in diabetes, for example, there exists an acid intoxication conditioned by the presence in the blood and tissues of β-oxybutyric acid and other acetone bodies. I have been able to show that when β-oxybutyric acid, either free or as a salt, is administered by irrigation to a muscle, the muscle behaves as if it had been fatigued by exhaustive labor, and I have explained the well-known proneness to fatigue of an individual suffering from diabetes as due in considerable part to the direct action on the tissues of β-oxybutyric acid and perhaps other associated pathological fatigue substances. It is probable that a similar explanation will hold for inanition, the pernicious vomiting of pregnancy, and the various other instances of acid intoxication, all of which are characterized by marked fatiguability. What has been said of β-oxybutyric acid is equally true of indol, which likewise is depressing to muscle and the presence of which in abnormal quantities within the body is associated with a similar tendency to fatigue.[*] It has been maintained [†] that the inability to perform continued labor that is so pronounced in neurasthenia rests likewise upon analogous metabolic causes, the identity of which has not yet been established. I think it probable that future research will greatly extend our knowledge of the metabolic bases of fatigue. Especially do I look for such a rôle to the intermediate metabolic products which may be present in abnormally large quantities in various pathological states. Such a conception too appears to me to afford the most probable explanation of the fatigue that appears to be present when the individual is endeavoring to labor in an atmosphere at a high temperature and a high humidity. Here he has to contend not only with his normal fatigue substances, but with the pathological substances that result from the peculiar conditions of his labor.

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[*] Goldscheider und Flatau: Fortschritte der Medizin, 1897, XV, p. 245; do., 1898, XVI, p. 124. Cf. Moxter, do. p. 121, and Goldscheider und Brasch, do. p. 126.

[†] Marinesco: Comptes rendus de l'Academie des Sciences, Paris, 1906, CXLIII, p. 853.

[‡] Amato: Virchow's Archiv, 1909, CXCV, p. 544.

[§] Wood: Sunstroke, 1872, pp. 86 and 93; Thermic Fever, Pepper's System of Medicine, 1886, V, p. 392. Lambert: *Loc. cit.*

[¶] Lambert: *Loc. cit.*

[||] Lee: Journal of the American Medical Association, 1906, XLVI, p. 1491; also Harvey Lectures, 1905–6, p. 169; American Journal of Physiology, 1907, XX, p. 170; Popular Science Monthly, 1910, XXVI, p. 182.

[**] Lee: British Medical Journal, 1906, II, p. 1806.

But there is a further factor to be considered. More than a hundred years ago Alexander von Humboldt [‡] observed that heat increases the action of various chemical substances on various forms of living substance, such as the heart and the motor nerves. This has since been studied in many ways by many investigators, such as Hermann,[§] Kronecker,[¶] Luchsinger,[||] Lauder Brunton and Cash,[**] Richet,[††] and others, and it has become recognized as a general law, that the temperature at which poisons act upon living substance is a factor, as in other chemical phenomena, in determining the degree of their action—at a higher temperature their action is more intense. There seems to be no reason why this law should not apply to the case under consideration. This suggestion has indeed been made for normal fatigue substances by Patrizi [‡‡] to explain the ready fatiguability of human muscles submitted to localized hot baths. With even greater weight it can be applied to the human being laboring under the disadvantageous conditions of excessive temperature and excessive humidity. Normal and pathological fatigue substances are here present in solution in an overheated body. If they are toxic at normal degrees of temperature, their toxicity is more pronounced at higher degrees, and in proportion as mechanical work is performed and internal temperature rises, the more is working power lessened.

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[*] Lee: in Herter's The Common Bacterial Infections of the Digestive Tract, 1907, p. 254.

[†] Cowles: Neurasthenia and Its Mental Symptoms, 1891; cf. also Ballet; Neurasthenia, translated by P. Campbell Smith, 1911, translator's preface, p. XIX.

[‡] von Humboldt: Über die gereizte Muskel-und Nervenfaser, 1797, II, p. 218.

[§] Hermann: Archiv für (Anatomie und) Physiologie, 1867, p. 64.

[¶] Kronecker: Archiv für (Anatomie und) Physiologie, 1881, p. 357.

[||] Luchsinger: Thermisch-toxicologische Untersuchungen, in Grutzner und Luchsinger's Physiologische Studien, 1882, p. 33.

[**] Lauder Brunton and Cash: Journal of Physiology, 1882, IV, p. 1.

[††] Richet: La chaleur animale, 1889, p. 213.

[‡‡] Patrizi: *Loc. cit.*

I may, therefore, summarize my thoughts as follows: When an individual is subjected to an atmosphere that is charged with an excessively high temperature and high humidity, his bodily temperature is raised, his working power becomes limited, and there is an early oncoming of fatigue. In addition to the normal fatigue substances there are present other substances, products of an abnormal metabolism, perhaps of increased protein disintegration, which likewise act as fatigue substances. Both the normal and the pathological fatigue substances act toxically to diminish the activity of the tissues, and such fatiguing action is rendered greater by reason of the abnormally high internal temperature that is present.

If these considerations, presented from a purely scientific standpoint, are worthy, their significance ought to be more than merely academic. Industrialism presents numerous instances in which human beings are obliged to labor under the conditions here outlined. Constant submission to these conditions is detrimental to the well-being of the individual and ultimately of the race. This is an unnecessary situation, which sooner or later is bound to be relieved. It is the duty of men of science not merely to discover the conditions under which men labor, not merely to show how an environment is detrimental, but to use their influence to make of labor a physiological rather than a pathological exercise.

PUBLIC HEALTH—PAST AND FUTURE.

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Proper public health measures—by which I mean the possible and practical measures which a government may enforce on an assured basis of proven knowledge—hardly existed until forty years ago. Twenty years ago, the confusion on the theoretical sides of medicine and physiology were so great that there was little of real logic or reason in the public health teachings of the day. Even now, one often sees advocated as public health measures proceedings, which however valuable from aesthetic, cultural or even true sociological standpoints, are yet rather the result of a vague desire for what is believed to be racial advancement, than any real technical grasp of the direct relations of causes and effects connected with disease.

The public health men of yesterday were dealing with exactly the same broad facts that we are; but, dominated by an environmental doctrine, they interpreted them blindly, as we see now. Malaria was associated with swamps, influenced by prevailing winds, entered by the lower rather than the upper windows, was more likely to be contracted at night and so on. As observers, the men of yesterday were perhaps more acute than we. But they had a doctrine—and they marshaled their facts willy nilly into the doctrinal fold—the doctrine of environment. They saw the mosquitoes but did not consider them. They sought an environmental cause, not a biological one.

This doctrine made diphtheria a matter of soils; typhus fever a matter of "poor sanitation," starvation and poverty; typhoid fever a swamp and slough disease; tuberculosis a matter of the dark and damp. Facts that did not fit with these theories were glossed over or left to one side for future consideration.

Today we are in danger of a like doctrinal obscuration of actual observations. The immunologists have done so much that it is almost the fashion to put off energetic public health work on the lines we know to await that glad day when disease will disappear because all its possible victims have been immunized. A further and wholly unwarranted assumption is too often unconsciously made, —*i. e.*, that this longed for immunity, while it may indeed depend sometimes on the use of specific immunizing agents like smallpox vaccine, antityphoid vaccine, etc., can be cultivated by good food, proper exercise and the outdoor life—an idea which in the form it is usually held and presented has but a modicum of truth if any.

Lest I be accused of setting up a straw man to knock down again, let me say that exactly these ideas have been expressed in high American and Canadian quarters within six months. Yet what are the facts?

The immunity to measles acquired by an attack of measles is specific—it does not protect against scarlet fever, diphtheria, smallpox or even German measles. Very few persons are born with a permanent immunity to measles. Yet almost all are born with a temporary immunity to it, lasting during the nursing period. This infantile immunity has been explained as due to immunizing substances derived through the milk from the mother. I have suggested, and suggest again now, that it would be of intense interest to discover from records of maternity hospitals or other similar observations, whether or not this immunity of nursing infants to measles is present or absent in correspondence with the presence or absence of immunity in the nursing mother or wet-nurse.

The fact that the nursing child does not suffer from measles even if the mother be suffering from measles herself—and hence was not previously immune—does not settle the question; for it is quite possible that the dosage of immunity-conveying material in the milk may be greater than the dosage of pathogenic organisms the child receives *per oram* otherwise. Here also might be suggested the experimental use of mother's milk from non-immunes and from immunes for the treatment of older children suffering from measles.

In whatever way the nursing infant is immunized to measles, the fact that he is immune seems well established. But this immunity is not a general one—it does not protect him against smallpox or tuberculosis. Hence, the protective agent, whatever it may be, which protects against measles, is not the protective agent, whatever it may be, that protects against smallpox. But the smallpox protective agent may be added to him by vaccination. Thereafter as he grows up, the measles immunity which he had at birth disappears, the smallpox immunity which he acquired continues, and both these are true absolutely independently of age, sex, color, feeding, fresh air or any other known bodily status. Surely immunity to the infectious disease is not due to general vitality, or upbringing, but to a specific thing differing for each disease, and not susceptible of increase or diminution by mere environment.

If we turn now and look into the future to see before us the ideal man, carefully bred, carefully raised, in accord with the true "rules of hygienic living" of which we talk so much and know so little, can we expect him to be not only of magnificent physique and brain, but also naturally immune to smallpox, tuberculosis and so on, because of that physique, because of the careful regimen, because of pure water, fresh air, good food?

We do not know of course. But if we dare draw analogies with the high-bred and greatly-cared-for stock of the modern scientific farmer, the prognosis is bad. To the agricultural student we must turn to learn the practical hygiene of the well and of health—we have not studied it in the human sufficiently as yet. Do we find high-bred, well-cared-for stock more resistant to infection? On the contrary, they are less resistant. Scrub cattle roughing it on the prairie will stand more than the most magnificent specimens of their race reared carefully amongst the best surroundings. Nor is this true of animals only. Even amongst plants the same thing appears to be true. If resistance is a part of general well-being and a logical result of observing the laws of health, these facts are at present inexplicable. On the other hand, if resistance be a matter of intended or accidentally acquired specific immunity, the reaction of the body to an alien substance, specific for that substance, it is possible to understand it all.

What, then, is the outlook for the future? It seems to me that we may venture two hypotheses—two possible modes of reaching freedom from disease.

The one is that which, perhaps, as suggested in substance by Theobald Smith, is working itself out today—the isolation of severe cases of disease, with neglect of mild ones, tending *in the long run* to eliminate the virulent strains of organisms and to propagate the mild ones. The latter diffuse immunity through the community, in hit or miss fashion it is true, but still do gradually immunize a large number of people through mild at-attacks. This in turn cuts down the severity of epidemics and in time may result in a general modification of the disease.

It is true that diphtheria is seldom now the frightful disease of thirty years ago, even when fatal; and whooping cough is rarely seen in the severity that older epidemiologists describe.

The other view is this—There is no advantage in immunizing a race against a non-existent disease. Why not make the disease non-existent and do away with the need for immunity? Why not abolish infectious diseases and send the race on, unprotected, but safe because there is nothing to be protected from?

One hundred years ago the Western father who did not teach his son to shoot was neglecting an elementary essential preacution against the Indians who beset him on every hand. It was unheard of—a crime against the white race. So now, with smallpox stalking abroad, the child, who is carelessly left unvaccinated is being treated just as badly as the boy of one hundred years ago who was not taught to shoot. But we removed the Indians—why not remove smallpox? The first was a brutal movement—the second a most exalted one. Why should we immunize for in-indefinite years to come at considerable expenditure of time and money when a very few years' concerted effort would abolish infection? Compulsory vaccination is good—but has never been carried out except under a military régime. Why not abolish smallpox and do away with vaccination altogether? Antityphoid inoculation is good, but it is as hopeless a method of getting rid of typhoid fever as vaccination has proved to be in getting rid of smallpox.

Both have saved innumerable lives and prevented innumerable cases; but neither promises to abolish either disease, while the existence of vaccination gives health officers a valid excuse for neglecting to stamp out vaccinatable diseases—on the ground that no one need have them if they will protect themselves. True—but it ought to be unnecessary to protect one's self. No one need be killed on a grade crossing, but that is no reason why grade crossings should be permitted. The future demands not restriction of disease, but abolition; not the protection of the individual by individual effort, but the removal of the need for protection by proper governmental action.

THE TREND OF MEDICO-SOCIAL EFFORT IN CHILD WELFARE WORK.

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Read before the American Public Health Association, September, 1912, Washington, D. C.

I am very glad to have this opportunity to discuss what seems to me to be the trend of medico-social effort in Child Welfare work before this group of physicians, sanitarians, and laborers for the public health, because, as I understand it, this is the first time the social worker has been formally admitted into your councils, and because *as* a social worker who has been thrown into close contact with scores of physicians and health officers, I have the deepest appreciation of the work you have done and of the tremendous import of your attitude of mind and your influence, not only on Child Welfare and health problems in general, but on the social good.

First of all, let me say that the problem of Child Welfare, in the sense that I understand and use the term, is a health problem not to be dis-associated from, and, indeed, from the practical standpoint of its solution, synonomous with, the general problem of public health. Because, however, of its quick appeal to the sympathy and understanding of the general laity, growing out of the fact that it is now generally recognized that the children of today are the men and women of tomorrow, and that work in developing strong and robust boys and girls is more profitable than work in mending conditions of adult sickness and disease, *I* believe that the surest and quickest way to public health is through Child Welfare work; and that in building the machinery for this work we are building the machinery for carrying on all those other forms of social and medical activity which ultimately will convey health to every home.

In the Child Welfare movement, as in all other movements for public health, two forces have been particularly active—those embraced by the medical profession on the one hand, and those of the so-called social worker on the other. At first the line of demarcation between these two forces was quite distinct. Of late years it has been growing less so. Students of sociology today clearly recognize that most of the problems which social and philanthropic agencies are endeavoring to solve are health problems, while on the other hand, the fact is also beginning to be apparent that most of the diseases which physicians and health authorities are treating and endeavoring to rectify have their origin in social causes. Reflect for a moment on the work which is being initiated and carried out by such agencies as are found in the United Charities Building in New York City. The activities of the Committee on the Prevention of Tuberculosis, of the New York Milk Committee, of the Housing and Pure Food Committees and the Committee for the Prevention of Blindness—the very names indicate how deeply the philanthropic world is delving in health problems. On the other hand, consider that most of this effort, begun in purely a charitable or philanthropic spirit, has found, or is finding, its way into our health departments; that many of our leading hospital experts, recognizing that they cannot even properly diagnose and prescribe without understanding the social conditions under which their patients live, are establishing bureaus of social service in the charge of non-medical workers; and that a layman—a social worker—at this moment is directing Boston's largest dispensary. Consider these things, I say, and you will agree with me, I think, that health work is fast developing beyond those limits wherein the medical practitioner has long been wont to hold uninterrupted sway.

Slowly but surely a new concept is dawning in the minds of those who are working and thinking on these problems. Slowly but surely we are coming to realize that even the ethical character of a people has its basis in physiology; that this thing we call health is the foundation and source of civic righteousness; and that anything which tends to deprive any man or woman, youth or maiden, boy or girl of an essential to its physical growth or development is a wrong not only physically, but intellectually, morally and spiritually against this and succeeding generations.

I say that physicians and workers for the public health are *beginning* to grasp this concept. Perhaps I should say they have as yet only "sensed" it. Certainly they have taken no steps to meet the new problems which action in conformity to such a concept would logically involve.

The reason for this is, of course, purely evolutionary. In the progress of human events circumstances of growth and development inevitably have compelled us to do the thing nearest to us first, without questioning and, indeed, without knowing at the moment, what lay beyond. For this reason medical and social efforts, even at this supposedly advanced stage of thought along health lines, are still largely occupied with remedial and corrective measures. Prevention is practiced, but, after all, practiced on a restricted scale. Causes of tuberculosis, infant mortality and the like have been worked out, and more or less clearly defined programs to eliminate these evils have been formulated; but the pressure of each man's work and the lack of constructive leadership have prevented us up to the present moment from carrying out the broader forms of prevention which recognize that the solution of each separate problem is inextricably bound up in the solution of every other problem; and that the *whole* problem cannot be solved without concerted and organized effort, not only along medical, hygienic and sanitary lines, but along every known line of social effort.

That this is so, and that greater progress towards organized prevention in public health work has not been made, is a thing which the social worker must be given a chance to rectify; for he it is, with his special experience and training, to whom we must look for guidance when the problem of health shifts to social grounds.

In making this statement I do not mean to imply that the physician, as a leader in health work is necessarily to be supplanted by the social worker, nor do I fail to recognize the tremendous contribution which he has made along lines other than those which are strictly medical. In the very social field of which we are speaking his researches and discoveries have been unquestionably foundation stones. Without his self-sacrifice and generous contribution of time and service most of our chartiable and philanthropic activities which have since developed along the broader lines of social and community effort would have been impossible. Without his activity and enthusiasm social progress could not have advanced to the point which it has reached today.

Still there *is* a very distinct difference between the practice of medicine and social work, and the time has come when for the sake of efficiency in our health movements this difference should be made clear.

Perhaps it will help, in setting about this task, if we first understand and appreciate what are now becoming recognized as the essential steps to all social growth.

These steps are as follows:—

First, there is the laboratory work—the work of study, investigation and research to find out the causes of bad health and deleterious conditions and to learn what must be done to remove these causes.

Next, there is the work of education and publicity—of telling others the truths learned in our laboratories and by study, investigation, and research—of multiplying the number of individuals who know what ought to be done to remove the causes of bad health and deleterious conditions, and of creating a public demand that it *shall* be done.

Lastly, there is the work of organization—the actual doing of the thing that ought to be done.

Let us now take the problem of Child Welfare and see what part the physician, what part the social worker, has played and must in the future play therein.

No one will deny, I think, that the physician, by discovering and pointing out the immediate causes of sickness, diseases and death among babies, give the first great impetus to the Child Welfare movement. His work in this connection is that of the specialist, the student, the investigator. Dealing with bodily disease among babies he naturally was first to ask the question "why?" when stunted and distorted little beings came beneath his notice; and it was not long before an answer was evolved.

Once this preliminary medical research work had been done, however,—once the relation between specific diseases and their immediate causes had been established—new problems arose. Take for example, the question of the milk supply. All of us know the relation between bad milk and intestinal diseases among babies. Physicians discovered this relation for us, and by doing so showed us the necessity of a clean milk supply. This accomplished, however, their part as physicians, strictly speaking, ended. Thereafter the base of investigation shifted. No longer was it a question of discovering what made the baby sick, but what caused the milk to turn sour. To settle this point the chemist, bacteriologist and sanitarian, none of whom need necessarily be a physician, although much of their work is still associated in the public mind with holders of a medical degree, were brought in. With their assistance methods of milk production, handling, refrigeration, delivery and sale were evolved; sanitary machinery was suggested, principles of operation were laid down. But this work did not solve the problem. Not only is clean milk necessary, but it must be cheap. Otherwise those who need it most may go unsupplied. Here was a problem for the business man and economist—a problem closely related to transportation and a score of other purely industrial questions. Meanwhile the work of organizing and directing forces of country milk inspection was going on; legislators were endeavoring to secure the necessary appropriations; lawyers were working on milk legislation, while countless other forces were turned loose on the problem, each making its own contribution to the final solution.

All this work has been done merely to rectify certain deleterious conditions in the physical elements of a food product which, like water, gas and many other commodities upon which the health of communities depends, is largely under public control. Much of it has been done by individuals who, in all likelihood, never held a baby in their arms; but has this marred their efficiency? Not a bit. For this is a purely scientific problem, the object of which with them has not been the baby but the milk.

Still all of us know that in the reduction of infant mortality intelligence among those who actually care for the baby is a prime factor. Even the purest milk, if exposed to the dirty air of a tenement, and supplemented by pickles and tea, is not enough to keep a baby alive. Ignorance of simple and fundamental principles of care and hygiene on the mother's part kills many a baby. Physicians again have discovered this and other general hygienic facts for us, but it is left largely to the visiting nurse and the social worker to spread intelligence on such matters in the home. Thus even in what hitherto has been regarded as the physician's exclusive field —the personal oversight of individual babies—other workers have entered to do what he has shown to be necessary. Doctors and social workers alike are beginning to recognize that, while corrective treatment of existing sickness will remain a factor for a long time to come, emphasis hereafter must be placed more and more on the development of preventive measures. It has become axiomatic to say that it is more important to teach mothers how to keep their babies well than to cure them after they are sick. It takes skill and training to correct a deranged digestion. It takes simple common sense, combined with a knowledge of what constitutes wholesome food and right living, to prescribe a regimen which will make a deranged digestion an impossiblity. Teachers do not need to be scientists. The laws of health, like the laws of astronomy and mathematics, need only to be understood, propagated, and obeyed to secure beneficent results. And because the physician (except where he is directly connected with some organized social effort) has no spare time or energy for social teaching the problem of dealing with the ignorance which he has pointed out as a chief cause of infant mortality, like the problem of improving the purely physical properties of milk, has passed into other hands.

But even when we have taught mothers, and improved the supply of cow's milk, we are still far from the solution of our problem. Why, for example, is cow's milk necessary for the infant? Why does not the mother nurse it herself? These questions, raised by the physician, find an answer in social conditions. Overwork, nervousness, anxiety, too frequent bearing of children, malnourishment, undernourishment, even ignorance itself —these and other conditions which affect not only maternal nursing, but maternal care in every other direction have their origin in conditions of home and family life. Perhaps it is the father who is out of employment, leaving his wife to become the wage earner at the expense of her infant; perhaps it is a case of preventable illness among one of the older children which has drained the family budget a thousand circumstances and conditions, which fill the case records of our charitable and philanthropic societies—all exert a direct influence on the mother and babe. Thus we see that infant mortality from being a purely individual problem, is developing into a social problem. Whatever deleteriously affects the home and the family, we see, deleterioulv affects the child, and our *chief* problem, therefore, becomes that of rectifying these deleterious conditions and of discovering the means of their removal.

This is the task of the social agent.

He or she it is who deals not with the baby alone, or with the mother and baby, but with the father, the little brothers and sisters, the grandparents, the aunts, the cousins and the neighbors, each and all of whom, in every act and relation of life, are inextricably bound up to its health and happiness.

But now we are led by our problem far beyond the home for clearly, work which is confined merely to the family group will never rectify those conditions of employment, wages, and the like which find their roots in social organization on its broadest scale. From the treatment of bodily ailments in individual babies and the passing on of scientific discovery to specialists for special use, we have come to the treatment of society as a whole; to the discovery of the most complex and difficult social relationships; to the education of people by the hundreds of thousands and through myriad channels; to the organization of all forces which exist to promote health and relieve distress.

The physician, through his investigations and experience, has laid the foundations of data and information on which public health is being built up. He has indicated the problem, but others are now needed to work it out in conjunction with him.

In the field of things physical the sanitarian is now a recognized necessity to all health work.

In the field of things social an expert is also vital to the development of all health programs; but this fact is as yet little recognized by physicians and health officers. A very real need exists in our health departments today for social organizers and directors—men and women of special vision, training and experience in social work—who will do for whole communities work of social organization which is already being done by philanthropic leaders in single and smaller fields. All over the world students, scientists and thinkers are discovering for humankind the *immediate* medical, sanitary and hygienic causes of suffering and ill-health. The problem now is to discover the social causes of these other causes and to formulate and direct against them a social program, in which all forces shall take part.

This is the work of the social specialist. He may be a physician, or he may not. A medical degree certainly is not an essential. What he must have is social vision and definite social training—the ability to see things in the large and the experience to put his vision into practical social programs.

Health work, viewed from the standpoint of social prophylaxis is passing from the practicing physician's hands. Hereafter if the physician wishes to play an effective part in our health programs he must make a deliberate choice between three professions:—first, his own special calling, requiring as it does, years of intensive thought, study and experience and concerning itself largely with problems of individual health; second, the profession of the sanitarian which deals with physical elements; and lastly, the profession of the social organizer dealing with social conditions in the aggregate.

The choice between practicing physician and sanitarian already has been made by many men, and a few, recognizing instinctively the need of social organization in health work, have given themselves to it with marked success. In no city as yet, however, has this branch of effort in health work been pushed nearly to the point where it could be if medical men and health officers, still lacking for the most part in social training, would call upon the social specialist. Among some of them, at least, there is still antagonism to the social worker. The idea that health depends upon social causes has not yet gained its way. Reluctantly will they admit that this most effective kind of preventive health work requires the services of one who may not possess a medical degree.

An illustration of what I mean, and of the social loss that may result has just been furnished by Milwaukee.

In May, 1911, in response to a widespread public demand, the common council of Milwaukee passed a resolution authorizing the mayor to appoint a Child Welfare Commission, the object of which was to study and investigate the causes of infant death, and to formulate and carry out a plan of Child Welfare work from the standpoint of the entire community.

Three leading physicians were appointed to serve on this committee —a professor of pediatrics in a local medical college whose enthusiasm and interest had been responsible for the Certified Milk movement in Wisconsin; an obstetrician—the head of a local maternity hospital which had long played a prominent part in the infant welfare campaign; and a general practitioner, who was known throughout the state for his activity in social movements and who had especially identified himself with efforts to reduce infant mortality. A social worker, who had given five years of special effort to infant mortality and Child Welfare was engaged as executive.

The work of the Commission during the first year was devoted to a comprehensive survey of the local field, embracing such special studies as the cost of an infant's milk; a study of the care of babies in hospitals, institutions and baby farms; a close analysis of the social data contained in 10,000 birth certificates for 1911 and of 1200 death certificates for 1910 and 1911; a study of the relation of the problem of infant mortality from the educational standpoint to the problem of the school and the social center; a study of work to reduce infant mortality at home and abroad; and a special study of methods of work and their cost in restricted local areas specially selected for demonstration purposes.

Basing its conclusions on the knowledge and data gained in this intensive and extensive survey, the Commission at the end of the year formulated what it called a "community plan" for meeting this problem. An ultimate and immediate program of work, based on a unit system of preventive health centers, was laid down, to carry out which it was proposed that the municipality, through its Health Department, should continue and direct the work of social organization, promotion and education which the Commission up to this time had been doing and which it regarded as absolutely essential to the development of Child Welfare work.

This program was not carried out because of the opposition of a physician, formerly health commissioner of Milwaukee and under the recent change of administration its present mayor. His insistence was that the problem of Child Welfare was largely medical in character and that, as such, only a medical man could properly direct it. Ignoring the recommendations of the Child Welfare Commission (which, I am glad to say, were endorsed by the Milwaukee County Medical Society at a special meeting called for their consideration), he dispensed with their services and reduced the work which they had been doing to a routine function of the Health Department, for the head of which there was secured at an inadequate salary a young man one year out of medical college with neither medical nor sociological experience in this field.

I mention this specific instance because if, as I firmly believe, the trend of medico-social effort in Child Welfare work is towards social organization and promotion, then the lack of understanding and appreciation of this fact illustrated by the opposition to it of a supposed health expert and municipal leader seems to me to point a very serious moral indeed.

Social organization in Child Welfare and Health work is bound to come. The whole trend of effort is in that direction. The rapidity with which public health officials recognize this fact and call upon social workers to assist them in their social programs, as they have already called upon sanitarians to help them in their sanitary programs, will measure the rapidity with which our general health problem, so largely dependent upon social conditions, will be solved.

SOME NOTES ON RECENT TYPHOID FEVER OUTBREAKS IN KONA, HAWAII.

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Read before the Hawaiian Territorial Medical Society.

Shortly after my arrival here in 1904, namely, on the 17th of April, I was called to see a case of typhoid fever at Hookena. The patient, a female Hawaiian child of four years, it was claimed, came up from Honolulu a few days before and had been ill there only a week. There were no further cases at this place, but April 19th, a Japanese male was taken ill at Honokohau some twenty-five miles distant from Hookena. This closed the record for that year.

On April 5th, 1905, I had a very severe type of typhoid fever in a native boy aged 22 years who was employed as a hand on the steamer plying between Hookena and Honolulu. He had been ailing for nearly two weeks with headache, diarrhœa, and slight fever before he made up his mind he was sick enough to go to bed. There was no definite history of exposure except that he had mingled with his kind in Honolulu. No further spread occurred till September 1st when Moana, a native male, aged 22, was taken down. He lived at Hookena beach not over half a mile from Apela, the steamer-hand.

October 15th, Ella Waiala took ill, her home being some three miles above Hookena at an elevation of about 1,300 feet.

Ten cases followed in eight houses at different locations along the Government Road, all within a radius of two or three miles, the epidemic ending December 9th, with a Japanese laborer, aged 23 years. There is no other way of explaining the spread except by contact. As soon as possible each house was thoroughly fumigated and those recovering disinfected, but during the epidemic it was impossible to keep members of the different families from visiting back and forth, and, after convalescence, friends came in to offer congratulations, embrace, kiss, and so on.

One year passed by without any further outbreak, when, on April 26th, 1907, a Portuguese, aged 18 years, came up from Honolulu and went to bed with what proved to be a severe type of typhoid fever.

The next case occurred at Kealakekua, W. Caucasian, male, aged 33, laborer, this being late in October 1908. The real affection was masked by a coincident pneumonia, made more formidable by the fact that the subject was a drunkard; and a late and fatal intestinal hemorrhage was the only indication that the patient had typhoid fever. There were no abdominal symptoms, and, during most of the illness, there was low temperature with no rise and fall. The patient's sister G. W. nursed him throughout the illness. He died November 22d.

January 13th, the W. baby became ill with what appeared to be a severe bronchitis, but he was treated for typhoid which soon declared itself. None of the other members of the household, three in number, contracted the disease, and G. W. returned to her father's who lived about half a mile distant.

March 27th, Mrs. Mia, at Laaloa, at least ten miles north of the W. house, was taken ill, and two months later died of typhoid toxæmia. During the month of May, same year, there occurred at Kamalumalu, north Kona, about a quarter of a mile from the Mia house, the death of a Portuguese, male, laborer, aet. 24 years.

Taken ill in Honolulu, he came to Kona on the 14th day of his attack, and died at the end of the third week. His death reported to the Japanese doctor as due to typhoid fever, was seen by Dr. Hayashi a few hours before it occurred, the immediate cause being a severe and uncontrollable intestinal hemorrhage.

Upon investigation, I found that the sister of the deceased was ill with typhoid, as well as nine other persons, scattered among six Japanese houses within a radius of quarter of a mile, and not half a block from the infected Simas house.

Theses cases diagnosed as "cold," "grippe," "diarrhœa," were, of course, not reported to me as contagious or infectious.

I found that this Portuguese family was supplying milk to the six infected families, as well as to one or more families nearer by; that the milk, of course, was unboiled and carried in very unclean bottles. These were ordinary quart beer bottles with cork stoppers, and sometimes paper. In fact, the family was notoriously filthy not only as to dress and habits but in their cooking.

The next cases occurred during the months of June in a native house a short distance (third of a mile) from the Simas place, receiving its supply of milk from the latter.

From this source the disease was carried by contact to Kahaluu, a settlement of natives about half a mile distant.

In these two villages 12 families were involved, in one family there being 11 down with the disease at the same time, four of them dying. Despite our efforts, the sick were taken away, some to the beach on horseback, others to other places, until we secured police control of the infected premises. One patient died while being conveyed to the beach on a mule.

While these cases were in hand, a native man at Keokea, 17 miles south, became ill and died of the same disease.

About the middle of June I was called to attend two daughters of R. W. the father of W., living at Kealakekua, as mentioned before. These girls had been taken ill two weeks previously. Upon determining that the disease was typhoid, and learning of the domestic arrangements of the household (there were nine other members of the family), I urged the removal of the well, but this was objected to by the parents and, indeed, there was no place where the infected patients could be properly treated.

One by one the members of the family were stricken down, in the following order:

G. W. (who had nursed her brother) aet. 21 years, female; Alma, aet. 18; Charley, aet. 33; Mollie, aet. 17; Rudolph, aet. 9; W. Sr., aet. 60; Violet, aet. 6; Mrs. W., aet. 42; Vannie, aet. 10; Maggie, aet. 12; Henry, aet. 24.

Ten of them were in bed in the same house at the same time; Henry was taken later when we had established a temporary hospital.

I may mention in this connection that two sons had died a few years previously of typhoid intestinal hemorrhage, and one daughter was "given up" by her physician in San Francisco, suffering from the same disease.

There seemed to be in each case an idiosyncratic liability to bleeding: epistaxis, intestinal hemorrhage, dysmenorrhœa, and hematemesis, and, whether due to glandular alterations of the intestinal mucosa, or to gastric dilatation and attendant conditions (all of which according to Osler and others are said to induce to typhoid), it was under the circumstances impossible to determine.

Early in July a member of A's family next door to W's, was taken ill, and four other members in the house contracted the disease, as well as a niece who was staying with them.

During this month Mrs. K. aet. 36, who nursed the W. family for two weeks, was taken ill and died four weeks later, after a severe and pitiful struggle with persistently high fever, bronchitis, praotitis, nephritis, cystitis, chole-cystitis, pneumonia, peritonitis and final toxæmia.

Towards the last of July a Japanese who had been doing the washing for the A. family, came down with typhoid fever. Then followed cases here and there in the district, two natives some three miles south, a Portuguese ten miles north, and so on.

The season was unusually dry and warm, and the epidemic lasted through July, August, September, October, November and December, cases breaking out in different sections; 4 in Kealakekua 10 miles from W's house; 5 at Kahaluu, 7 miles north, and 3 in a Portuguese house at Kainaliu in September; 6 in Kahuluu, and 2 at Kealakakua, in November.

There were two cases in a Japanese house at Kalahiki 15 miles distant from the original focus, closing the record for 1909.

In July, 1910, Dr. Hayashi reported two cases at the Plantation Camp at Kainaliu, as "para-typhoid," but when I saw them I found them to be typical cases of typhoid, and had them removed to the hospital. A sporadic case, third week of illness, was found about half a mile from the hospital. The patient, a native woman had been here only a few days, having come from Honolulu to Kona because she was "sick." Two of her children in Honolulu had died before she was taken ill. September 6, a case was reported from a native house one mile from the Simas house, and on the 10th the first of a series of 15 cases among a group of four native houses just above Kainaliu, was taken ill. Nearly every member of each family had fever, and the epidemic lasted till December 26th, when it ended without another fresh infection.

In August, 1911, during my absence at the Coast, typhoid fever broke out at Kawaaloa, a location from three to five miles from Kealakekua. There was some doubt as to where it originated, but it was supposed that a woman who came to Kailua while ill and was taken to Kawaaloa where she died, must have had typhoid fever.

D. S. Bowman, Chief Sanitary Officer of the island with his usual efficiency took the cases in hand.

Unless there were cases not reported to any of the physicians in the district, Kona was free from typhoid fever August 24th, when I left for my vacation. The only disease that might have been mistaken for it by the laity, were two cases of pneumonia at Kealakekua which I saw and treated before leaving.

After my return, on the 25th of November, 1911, I found a case of typhoid fever in the same group of houses where the epidemic of 1910 occurred, and the same boy whom we had discharged from the hospital at that time, was ill. His case had been long and tedious in the first attack, and when we found him in the second he had been ill a month and was in a moribund condition. dying a week afterwards. The day we removed the boy to the Hospital we found at Kealakekua Kele, native 36, ill of the same disease, He had nursed the Kawaaloa patients, and returned to his home.

The last case ending the year 1911 was taken into the Hospital at the close of the year, a woman who contracted the disease from a friend who came to visit her from a neighboring district (Hamakua), and spent his holidays in bed at her house.

EPIDEMIOLOGY.

The course of the original epidemic was easily traced, of course. Next, from Honolulu to the Portuguese house, and from that prolific source, *per viam lactem*, to the six Japanese houses, and the native place close by. Here the frequent visitations with food exchanges, and intimate hospitalities, spread the disease to Kahaluu, from there in the same manner to locations on the beach, Keokea, Kealakakua and Kalahiki. That is, by personal contact, by food, clothes, drinking cups, accomplished in surreptitious nocturnal visits.

I doubt if police supervision, as we have it here, will check this intercourse to any extent. The only way to stop an epidemic in Kona, is to place all the patients in a hospital under the charge of responsible nurses, and then thoroughly disinfect the infected quarters. This we finally have done with success.

How the two W. girls contracted the disease is harder to determine, as they were Caucasians, and did not associate to any extent with the natives. But one of them had nursed a brother with the disease, leaving the house at his death which occurred November 22nd, and remaining at her father's house thereafter, till she was taken ill June 15th of the next year, that is, nearly seven months after exposure. Contact and want of care, perhaps, in handling cups, glasses, etc., passed the disease from one member of the family to another.

Naturally, in a small house, eleven patients all in bed were not easily cared for although we had two trained nurses as well as several other assistants.

Osler says—"Even in hospitals there is some danger, despite all precautions," and Schrader has estimated that 3.3 per cent of all cases are due to hospital infection." In many cases the disease was contracted by a child in the bed next to a patient with typhoid fever. . . . It is especially liable to occur if the hospital is unduly crowded." Now in the W. house we were "unduly crowded," of course, and so were most of the native houses, especially the one at Kahaluu where 11 persons were ill at the same time, confined to three rooms.

Of course we made use of the verandas, and, in some cases, I placed patients out of doors under provisional covering rather than have them in small ill-ventilated rooms.

The A's who lived next door to the W. house "ran in" to see their cousins; possibly they used their glasses to drink in.

Mrs. K., who nursed the W's was an early victim, but her sister, who also assisted, did not contract the disease.

The infection of the Japanese laundryman is also clear; and while all the subsequent infections may not be traced so clearly, they are easily accounted for by the well known fact that there was more or less intimate intercourse between infected and non-infected families which afterward contracted the disease.

Until the hospital was established we could not prevent this intercourse.

Each season the epidemic began at about the same time, and closed in December. In Kona, as a rule, it is dry from November to February, and the "wet" season comes on after that with variable showers till November or December again. The 1909 summer was rather dry, the two subsequent ones were wet.

Osler says, "the disease usually persists on into the Winter months, with a decrease after December," and so it certainly has been in Kona, although one should not think the application could be made in a tropical country where there is such a small variation in temperature.

We find in the last report of the Committee on Typhoid fever at our recent meeting of the Association:—"A striking seasonal (summer) prevalence of typhoid fever in a community should not be taken, however, as a positive indication that the disease is due entirely, or even in greater part, to endogenous infection."

Although the three outbreaks of typhoid fever in Kona were classically seasonal, the first was exogenous, as well as the last, while the epidemic of 1910 so far as we can determine was residual or prosodemic.

"In a sudden outbreak," says the report from which I have just quoted,—"in a community previously practically free from the disease, unless there is strong evidence that milk is responsible, water should be assumed to be the cause of the outbreak until proved otherwise." This is logical.

The outbreak of 1909 was caused by milk, but only in a limited radius, outside of this the infection was spread by contact, and in a few sporadic cases, by indirect pollution of either food or water. As is well known locally, all drinking water in Kona is stored in tanks, filled during the rainy season by showers falling on the iron roofs. These tanks are often filthy and hold large deposits of mud and other débris washed into them from the roof and gutters.

In a previous report I suggested that possibly the mynad bird which is a scavenger and a common visitant upon our roofs, might well be a carrier of the bacillus typhosus.

With feet freshly infected from typhoid excreta, it flies to the roof parading in its fashion over it, or carrying paper and other refuse into the gutters from which a new and rapid shower washes the infected material into the tank, where it is kept in the sedimentary portion from which the water is drawn.[1]

According to accredited observations made by reputable bacteriologists, the living germ of typhoid has been discovered in water kept for several months in a sterile condition.

To how much better conditions for preservation does the bacillus come to rest in the sediments of tanks which have not been emptied for years?

In no other way have I been able to account for sporadic cases occurring in widely separated houses, where infection could not have been passed by contact; in regions where the ordinary insect carriers like flies, mosquitoes, cockroaches, etc., could not have been factors; where, indeed, the infection seemed water-borne and the probable cause the far-flying mynah.

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[1] Short Report of the Kona Epidemic of 1909, to U. S. Surgeon-General.

I called the attention of the plantation authorities on Kauai in 1900 to this possibility of infection where several cases of typhoid occurred in the camps, and could not well be accounted for in any other way. Later observation here have convinced me of the probability of this means of transmission.

Since first making this suggestion I have observed the mynah scratching up fresh fecal matter, then flying off with its feet well covered.

"Surface wells and springs locally polluted," says Dr. Lumsden, "may give rise to few or many cases of the disease among the persons using them," The danger of infection through water supplies has been minimized by the influence of a retro-active pendulum-like swing of opinion which occurs in medicine as in other things, every once in a while; the facts do not justify it.

McCrae whose investigations are careful and conservative, says that water must be regarded as an important means of conveyance, and that "the steady decrease in the disease in communities as the water supply is improved is perhaps one of the best proofs of the importance of water-borne infection."

Shuder reports that in 638 epidemics investigated, infection was carried by water in 71 per cent of cases.

In presenting a summary of the valuable reports on typhoid fever in the U. S. military camps of 1898, Dr. Vaughan says that they "furnish most positive proof that the dissemination of typhoid fever was most largely from persons to persons through contact and not through infected water or food."

The locations selected as to water supply, and the fact that most of the drinking water was boiled, may account for the elimination of water as an important source of infection in those camp epidemics. Later investigations into water supplies and their relation to typhoid fever epidemics in cities like Chicago, Milwaukee, Toronto, Cleveland and smaller towns along the Great Lakes, show unmistakably that the discharge of sewage into the Great Lakes results in severe and frequent outbreaks in typhoid fever in cities and towns which derive their drinking water from those sources.

This was remedied to some extent by extending the intakes far out into the lake, but finally the water was polluted there also.

I mention the matter here because it is evident that if the typhoid germ retains its vitality and infective powers in the Great Lakes where there is extensive dilution of organic matter, and in running streams where such matter would naturally have a tendency to disappear, how much more likely are we to find abundant sources of infection in our tanks and cisterns made available to the introduction of germ life by so many means.

Cups, glasses and other retainers are dipped into the tanks, to say nothing of other modes of pollution which I have specifically mentioned.

As is known, the bacillus typhosus has been identified in drinking water by the agglutination tests, by Wesbrook in Mississippi water, by Fox in Scranton reservoirs, and by others.

A most interesting isolation of the bacillus in well water was made this summer by Lewis of New Haven. Water from a boxed stone-laid well, about twenty feet deep, located where it was subject to surface wash of the cellar floor, was examined with the following result: "Plates, lactose, bile-agar in duplicate, showed 1,000 odd colonies after 48 hours, the greater proportion microscopically resembling the colon-typhoid group."

Without any apparent cause a maid who had come to the house to open it May 11th, was taken ill with typhoid fever June 19th. She had used this polluted water. And the only explanation of this pollution, so far as could be traced, was that some laborers who had access to cider in the cellar had voided urine on the floor.

"It was quite definite," says Lewis, "that the sample that showed the typhoid bacilli were from the house well, and considering the chemical partial analyses, and the negative colon test, it seemed very reasonable that urine could be the only condition giving rise to the situation." And yet as a mere surmise, how many would have for one moment entertained the idea that infection came about in this "far-fetched" way. Such instances show us how the spread of typhoid fever may be due to the most obscure and indirect contamination; that until we have negative proof, we need not ridicule the man who claims that some germs discharged into Lake Erie have caused an epidemic in Chicago. We simply show our ignorance if we ignore any of the possible channels by which typhoid may be disseminated over the country. It is due largely to this peculiar attitude of the professional mind that we have suffered so extensively.

There were neither facilities nor time for any extended bacteriological examinations or definite laboratory work. While this is to be regretted from a scientific and medical standpoint, I do not know that the findings would have helped us any in the adjustment of conditions or the care of our patients. Besides, this phase is well covered by other observers elsewhere.

Cultures of the typhoid-colon group were secured by Mr. Bowman, some satisfactory Diazo-reactions were made, and the bacillus typhosus was differentiated in some specimens of urine from a patient who developed a purulent cystitis.

In each epidemic the clinical evidences of the disease were so plain that the wayfarer though a neophyte could hardly err, but early in the outbreak of 1910, we had only sporadic cases which were reported by the Japanese doctor as "para-typhoid," "chronic gastritis," "diarrhœa" or "dysentery"– mild cases even after the symptoms developed, and unsuspected at a time when tests for leucocytic changes and lymphoid tissue alterations, would have had some value. Except as a test in presuspected cases, I have not much faith in the value of the reactions. Hultgen in his recent investigations says, "The Widal reaction is less specific than formerly believed. Its late appearance is its chief drawback, and owing to the indefinite onset of the disease all early Widal reactions should be viewed with suspicion."

And the fact that there is no cultural or morphologic difference between the typhoid colon family of bacilli, but only a biochemic one, makes the test of less value as a clinical asset.

The reports of Biron, Rolly, Naegli and Tompkins it seems to me confirm the summary of Hultgen:

"The study of the individual members of the typhoid, para-typhoid-colon group has demonstrated a marked discrepancy between the morbidity and mortality statistics of these affections—a breach in the epidemiology of these water-borne diseases, the generic relation of which was recognized by a layman before clinicians thought of it. The classification of water-borne and food-borne diseases, however, should be based on clinical evidences mainly. The early bacteriologic diagnosis serves essentially to identify the group to which the germ belongs, cultural tests being insufficient and serologic reactions occurring later in the disease.

"In order to diagnosticate a case of typhoid or para-typhoid infection early, we must suspect it earlier, that is, even before clinical evidences have become manifest. In typhoidal affections the preclinical symptoms consist in the bacillemia and the leucocytic changes which, presupposedly, must have existed for some time, perhaps for two or three days, before the onset of any subjective symptoms. The pre-Widal diagnosis of typhoidal diseases should be the rule, not the exception. Para-typhoid affections are seldom recognized in practice."

I believe this to be true, and the atypical forms of typhoid to which Osler called our attention years ago, and which we have seen emphasized in Tompkin's reports, point to the intimate relation between all affections of the gastro-intestinal tract.[1]

We are forced to the conclusion that many of our affections diagnosed as indigestion, gastritis or diarrhœa, are due to the typhoid-colon bacilli, since "neither clinical nor anatomic phenomena justify the strict separation" of the group fevers, and in the report on typhoid fever in the

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[1] Feoces in the Tropics, Medical Record, December 29, 1906.—Goodhue.

U. S. military camps of 1898 we find very generally that cases diagnosed as indigestion proved to be typhoid fever. For instance, in 190 cases of indigestion, 24 proved to be typhoid infection. The same thing occurred in disturbances diagnosed as "febricula," malarial fever, diarrhœa and dysentery.

"These cases show that the so-called 'indigestion' were frequently a prelude—more rarely a sequel, as in case No. 2—to typhoid fever," continues the report.

Bigelow, of Worcester, Mass., calls attention to the value of the Widal reaction in detecting typhoid germ carriers. "The agglutination reaction," he says, "seems of much value in tracing the source of milk-borne epidemics of typhoid fever, where in one case it was most instrumental in bringing a 'carrier' to light."

At one source of infection the dairyman had been producing milk for 30 years. Twenty-six years previously he had had typhoid fever, and again, a few weeks before the outbreak traced to his milk, he had had a slight attack of diarrhœa with some headache, and a slight amount of bright blood in his stools. In his case the Widal reaction was positive. Another case, a farmer, whose milk started a local epidemic of typhoid fever, was found to have had two or three weeks previously an attack of so-called 'grippe' of about two weeks duration, accompanied by 'cholera morbus.' "

Widal reaction positive.

And so on with a large number of these cases of mild attacks. In some of them the excreta and urine showed bacilli of the typhoidal group.

In one case at least of my series, that of a boy of 9 years who had a severe attack of typhoid fever August 1910, and who died of the disease a month ago after an interval of good health, we were obliged to attribute the second attack to auto-infection, as the house had been thoroughly fumigated, and a large family of children lived in it since last year's epidemic.

Evidently the boy carried the germs and in some period of susceptibility infected himself.

What is to be done to prevent such persons from spreading the disease? Manifestly it is impossible as well as impracticable to apply all the laboratory tests and reactions to all patients recovering from typhoid fever; and in no other way can we determine who is a carrier nor, upon determining what patient is a carrier, would it be possible to isolate and deprive him of his liberty or a modicum of it, for a period of possibly twenty-six years!

Moreover, in mild cases of "indigestion," diarrhœa, mucous-gastritis, dysentery, febricula, grippe, or walking typhoid, the most of which I believe, are due to some of the typhoid-colon group, how can we adequately diagnose and segregate them?

How can we prevent them from spreading the disease among those who may develop it in its typical form?

As a rough and ready test perhaps quite as dependable as the nitric acid test for albumen, Russo's typhoid test recently used at the Toronto General Hospital, is available in general practice.

The house or "typhoid" fly, as it is now called, has been shown to be a prolific cause of the spread of typhoid fever, by depositing on food or food containers infected material which clings to its body, or by the deposit later of bacilli which have been swallowed and carried about for several days. According to Fischer and others, the bacillus typhosus will live in the body of the fly for twenty-three days or more, and outside on the legs for four or five days.

Like the mynah, the fly delights in human excreta and, like him, in frequenting human habitation, but the fly alone has direct access to food and water which may thus be polluted.

In Kona there are few flies, so few indeed, that as a factor in the spread of typhoid fever, they practically may be excluded.

In August, September, and possibly later in some years, a few flies are to be found about the premises, particularly in the vicinity of horse stables. Near the W. house there was a large stable which at the beginning might have been a breeding place for the fly, but the menace was soon removed. At no time were there more than a dozen flies about the house.

In the W. house where we were cramped for room and without conveniences, the cockroach was our principal dread, and no doubt had a great deal to do in disseminating infective material.

Dust as a factor in Kona may be eliminated and so with soil contamination. Our porous rock is not conducive to germ pollution or perpetuation.

While we did not tabulate any data regarding the occurrence of intestinal worms (the whip-worm—*trichuris trichiura*, and roundworm—*ascaris lumbricoides*) in typhoid patients, my attention was called to the fact that in ten of our cases we had one or both of these parasites present, in one instance, that of M. W. several of the ascaris were vomited.

In regard to the virulence of typhoid in the tropics, Manson says: "It would appear that not only is typhoid a common disease in the tropics, but that it is also very virulent, with a death rate twice as heavy as the death rate of typhoid in England. According to my experience in China not only is the tropical form grave from the outset, but it is extremely liable to relapse. Besides exhibiting increased virulence, experience has shown that as against typhoid those sanitary safeguards which are found to be practically sufficient in England are by no means so effective in India."

There is neither time nor space to enlarge upon the methods of treatment we followed. Tub baths we were unable to give in any but the last outbreak, but sponging was carried out early, and all the hygienic measures which experience has indicated for such conditions. I used acetezone because with it larger quantities of water were consumed. Most patients take too little water, and the regular requirement of so much solution ensures it to them.

Meeting symptoms as they arise or, better, anticipating them if possible; the palliative method is about all that can be done. I know of no disease in which brains are more necessary in the attendants than in typhoid fever.

A little acetanelid occasionally when indicated; a little opium, preferably the powder, to quiet extreme nervous manifestations, a conservative use of whatever seems indicated for a particular condition; a sane and sensible vigilance throughout; these are the best therapeutic measures known to me.

I will only say that in my hands cold tub baths have not given me the results expected, but on the other hand, in many cases, they have proved highly detrimental and, in some high temperatures such as we get in jaundiced types here, I consider cold baths unsafe. I have substituted what in my opinion will prove to be of real benefit in the treatment of typhoid fever with high temperatures and severe nervous or toxemic symptoms, namely, *hot* baths, not warm ones.

Generally speaking, I do not believe that typhoid fever is more virulent in the tropics than elsewhere under the same conditions. Indeed, I believe it is less so. The same class of patients in a temperate climate, filthy, ignorant, careless, indifferent, surrounded by unhygienic and insanitary conditions, would give even a higher mortality than is recorded in the tropics.

Indeed, under right conditions, I have noticed quite a modification in most of the cases of typhoid fever in California and here, in the direction of amelioration, just as we find that in scarlet fever, this climate with its even temperature, cool nights, constant circulation of pure air and well-ventilated dwellings, conduces to a mild type of disease. The cold of a severe climate limits one's hygienic resources, and its sultry heat not found in Hawaii at least, has a depressing effect on the typhoid patient.

It would not be fair to base any deductions upon a series of cases of typhoid fever prevalent in native houses and running an uncared for course there. Here we had small, closed-up rooms with no air even from a window. Patients lay abed in their day clothes, unwashed during the course of the disease, sitting up with a temperature of 104° F., and eating any kind of food, paying no attention to the condition of the bowels which were often constipated for days at a time, or perhaps getting up and walking in the sun, or even taking a horse-back ride to the beach.

How many Caucasians with an ordinary attack of typhoid fever would endure such a course of treatment as this?

Under these conditions, in a series of 150 cases, the mortality was about 20 per cent; in the same number under hospital care our mortality did not exceed 8 per cent.

REPORT OF THE COMMITTEE ON COLD STORAGE.

Read before the American Public Health Association, Washington, D. C. September, 1912.

To the Members of the American Public Health Association:

The Committee on Cold Storage in making this, its first report, wishes to make it clear at the outset that this is only a progress report and by no means the final word on the subject. It asks the indulgence of the Association if vital matters pertaining to cold storage are not here discussed, as we have had only two months in which to collect our data and prepare this report.

Considering the dominating importance of the conservation of foods by cold storage and with a view to conducting it as a business along lines conducive both to health and commerical advantage, it is desirable that some official authority be constituted by Federal or State enactment in order that the results of scientific experiments and practical experience may bring about the establishment of uniform regulations applicable to the condition and preparation of the different foods intended for cold storage, to the temperatures and periods of time during which each is to be maintained in cold storage and to the conditions under which different foods are to be removed from cold storage or dealt with after transference therefrom.

The report of the Massachusetts Commission to investigate the subject of the cold storage of food and of food products kept in cold storage very ably summarizes the purposes and value of cold storage in the following words:

"In general, the Commission recognizes that cold storage is a fundamental necessity in the distribution of the food supply of the nation. In the first place, it enables perishable food products to be brought to market with the least possible deterioration; in the second place, it enables the surplus of such products in the season of natural plenty to be carried over to meet the demand in the season of natural scarcity. The latter is the principal economic function of cold storage. It acts as a means of distributing the seasonal output of perishable food stuffs evenly over the market year, thus helping to equalize supply and demand."

Speaking of the influence on health the same report continues:

"While abuses have arisen through the holding of food products in cold storage for unduly long periods and through the handling of goods by improper methods before and after, as well as during, refrigeration, the benefits that have come from the salvage of food through cold storage far outweigh any evils that have developed in this field. Cold storage has brought about an expansion and diversification of the food supply of the population, making certain kinds of food more abundant and more accessible. It thus makes for the conservation of the vital resources of the people. The gain from this source is universal and permanent, the injuries are occasional and temporary, and can be eliminated by proper regulation."

In considering the question of regulation or legislation on this subject the committee believes the following suggestions should be carefully borne in mind.

1st. "Cold Storage" should be deemed to apply to any process for maintaining food for human consumption at such temperatures as will maintain it in its highest state of wholesomeness.

2d. The term "cold storage building" or "warehouse" should be deemed to apply to an establishment employing refrigerating machinery or ice for the purpose of refrigeration, or a room or building otherwise artificially cooled.

3d. The term "article of food" as used in cold storage regulations should be interpreted to include all articles of food, animal or vegetable, for human consumption, requiring any regulation of temperatures for their efficient sanitary preservation.

4th. No article of food should be placed in cold storage which is not mature, fresh, free from disease or deterioration of any kind.

5th. It is essential that all foods possessing a temperature favoring some degree of deterioration should be cooled to a proper temperature as rapidly as possible with a view to maintaining it in its natural condition of freshness.

6th. After placing in cold storage it is essential to successful storage that the temperature and humidity found best for each particular food be maintained as evenly as possible.

7th. It is further essential that with certain types of food products circulation of air be maintained in the cold storage warehouse, and that an adequate amount of fresh cooled air be introduced each twenty-four hours; or, that the circulating air be passed through some solution depriving it of the volatile emanations of the food.

8th. Every storage warehouse should be constructed of such materials as will not cause organic emanations and in such a manner as will facilitate maintenance in as good sanitary condition as is maintained in the most modern plant employing the most modern methods for the preparation and handling of perishable food products.

9th. The periods of time during which food products should be allowed to remain in cold storage should depend upon their original freshness of condition, the continued maintenance of their optimum cold storage conditions and on the results of further investigations on each class of food products.

10th. It is desirable that frozen cold storage food products be raised gradually to higher temperatures varying according to the size and nature of the article of food in order to preserve the tissues in their natural condition.

11th. Articles of food should not be returned to cold storage which have once been released and raised to materially higher temperatures. When it becomes necessary to transfer food products from one cold storage warehouse to another the temperature should not be allowed to rise to a point favoring deterioration.

12th. In order both to maintain cold stored foods in the best condition possible and to preserve the credit of cold storage methods it is essential that municipal control of foods placed in retail stores for consumption be of the most practical and scientific character.

The committee has endeavored to ascertain what laws and regulations have been passed and are now in force in the various countries represented in this Association. There are six states in the United States that have legislated on the subject of cold storage. Congress has had under consideration a bill on this subject which, however, has not been enacted into law. Various unofficial bodies have studied the subject of cold storage and proposed legislation to regulate it,—notably the Chicago Association of Commerce and the American Association of Food, Dairy and Drug Officials. Canada has a law designed to encourage the cold storage of foods, but none of its provinces have legislated on the subject. Notable work has been done by the Massachusetts Committee to whose report reference has already been made. The committee gratefully acknowledges the assistance given by various branches of the United States Government departments, and the generous offers of assistance extended by the Association of Refrigerating Engineers and the Cold Storage Warehousemen's Association.

In offering this report the Committee recommends to the Association that the investigations which it has started be continued either through the reappointment of this committee or the appointment of another committee and that the succeeding committee be authorized to coöperate with committees of other associations, either at present appointed or to be appointed to investigate the same important subject.

Respectfully submitted,

DR. WARD L. BEEBE.
DR. PETER H. BRYCE.
DR. HIRAM BYRD.
DR. W. F. SNOW.
F. D. BELL, *Chairman.*

BOOK REVIEWS

PELLAGRA: History, Distribution, Diagnosis, Prognosis, Etiology, Treatment. *By Stewart R. Roberts, S. M., M. D., Associate Professor of the Principles and Practice of Medicine at the College of Physicians and Surgeons, Atlanta, Ga.; Physician to the Wesley Memorial Hospital; Formerly Professor of Biology in Emory College. Octavo, cloth, illustrated. pp. i.,+272. C. V. Mosby Company, St. Louis,* 1912. *Price* $2.50.

This is the third monograph on pellagra which has been published in the United States, and shows the growing interest in this subject. In his preface the author states that his book is intended for the student and the practising physician; that it is not an academic discussion of the subject; and he disclaims any intention of upholding any special theory of etiology. He also very truly adds: "There has been entirely too much speculation on Pellagra, and entirely too little investigation of Pellagra."

To a great extent the author holds to his promise; and, with some exceptions, later noted, he has presented his subject in a pleasing and forceful manner. His method is at times, perhaps, a little too dogmatic for a subject which presents so many uncertainties. And in spite of his statement that there is too much speculation he has allowed himself to speculate somewhat on the question of etiology. He has, however, greatly compensated for this by his sane views on other phases of the disease.

He has given a good résumé of the history and geographical distribution of pellagra. In his discussion of the clinical side of the disease he has departed from customary methods of classification and devised a rather elaborate classification of his own, which is of doubtful utility since it seems to have added neither to the clearness nor the simplicity of an already difficult subject. Outside of this rather awkward classification, however, he has given an good clinical description of the malady.

There are other places in the book where the author displays this same desire to strike out into new paths of classification or terminology, and very rarely with any satisfactory result—for example, his very questionable change of "pellagra sine pellagra" to "pellagra sine exanthemata" (*sic*); and his substitution of dermatitis and "dermotagra" for the usual term erythema, which by most dermatologists is recognized as the proper classification of the skin manifestations of this disease.

His remarks on diagnosis and prognosis are sound, and his discussion of treatment is commendable with the striking exception that he seems to think rest a factor of very minor importance—an opinion directly at variance with that of other men of wide experience in the United States where the disease presents features quite dissimilar from the Italian pellagra of today.

His ideas on etiology are very decidedly tinctured by the hypothesis of Sambon; and he adopts as likely the view that the disease is of an infectious nature, the casual agent being insect-borne. His discussion of etiology is consequently somewhat lacking the judicial tone which should have characterized it.

There are several errors in the book which should not have escaped the blue pencil. For example, "mal del higado" is translated "disease of madness," and "mal de saintes mains" becomes, rather ridiculously, "the sickness of the main saints." Many of the plates are so poor that they should have been excluded. The presswork is good, however, and the book attractive in appearance.

Aside from these not overimportant deficiencies, the book is a very good presentation of the subject and may be recommended to those interested in this disease, which annually has become of greater importance to the American practitioner.

C. H. Lavinder.

PUBLIC HEALTH NOTES.

Boot Workers and Phthisis.

"Having noticed the number of cases of phthisis which occur in Norwich among boot workers—and, of these, clickers in particular—Dr. H. Cooper Pattin, M. O. H., has been making an inspection (not yet concluded) of the clicking rooms at the various factories. He finds generally not so much inadequate means of ventilation as insufficient use of the means provided, comparatively high temperature and relatively overbreathed atmosphere being by no means uncommon. He found in some cases sweeping up of floors, etc., being done at unsuitable times, *e.g.*, just before work is started and concluded; and upon making representations to the managers found in every instance a ready response to his suggestion that the floors should be damped, and this sweeping up, etc., concluded whilst the workrooms are empty, and at least one quarter of an hour before the work-people are re-admitted. Doctor Pattin drew up and issued a short summary of recommendations *re* ventilation, etc., to be put up in the workrooms. Much dust appeared to collect upon stock patterns, and this must be disturbed when these are used. Two factors, apart from others, have a bearing upon the relative incidence of phthisis among clickers as compared with other boot operatives—one is the bad mechanical position taken up at work. The clickers stand and lean over their work-table, the position of the arms, etc., cramping the chest, and making its full expansion practically an impossibility. Another factor is the circumstance that clicking is regarded as the lightest type of bootwork, and consequently the less robust gravitate to it. 'From these two factors,' writes Doctor Pattin, 'one would expect, apart from all other considerations, a heightened liability to chest troubles. By clickers, it seems to me to be specially important that exercises and gymnastics calculated freely to expand the chest should regularly be taken, and fresh, unbreathed air secured in their workrooms.'"—*The Medical Officer*, September 7, 1912.

"Darkest Cincinnati."

The Cincinnati Anti-Tuberculosis League is making a campaign for better housing conditions in Cincinnati by using motion pictures. Believing that the high death-rate from tuberculosis in Cincinnati is largely due to bad living conditions, an effort is being made to create a sentiment among the people that will compel the correction of these conditions.

A special appeal to the people of Cincinnati is being made through the medium of a motion picture film entitled "Darkest Cincinnati." This motion picture is contained in a reel of 1,155 feet of film, carrying forty-two scenes, and requires twenty-two minutes to exhibit.

On October 10 this film had been exhibited for two days in various theaters with a success that surpassed the most sanguine expectations of the officers of the League. The attendance for the ten days was over 21,500. Based upon the statements of the theater owners, this is about three times the usual attendance of these theaters. The picture was shown in some theaters having as low seating capacity as 250, where it was necessary, in order to handle the crowds in front of the theaters, to display at times the picture in successive exhibits, cutting out all the other parts of the regular program. The theaters have been supplied liberally with literature to distribute to their patrons. The theaters have also been supplied with streamers and single sheet posters, one a "tomorrow" poster and one a "today." Besides this, the theater owners have announced the coming of the film to the audience several days in advance, with a slide. The newspapers likewise have been liberally announcing the itinerary in advance.

More than 15,000 copies of the report of the recent survey made by the League were distributed at the theater doors. It was planned at first to carry on the special campaign only for one month to November 1, but applications from theaters have been received well beyond this date and it may be necessary to extend the campaign.

The film was taken by a Cincinnati firm under the careful supervision of the Anti-Tuberculosis League, which paid for the entire cost of production. It shows typical scenes in panorama and in other ways of various sections of Cincinnati, especially those where housing conditions are bad. Individual houses and selected groups of individuals are also shown. Under each title there is a carefully prepared aphorism driving home the moral of the picture. The picture closes with a description of the work of the Health Department and the League, showing the dispensary, visiting nurses, day camp, a city sanatorium, etc.

Nursing at a Half Million a Year.

Beginning with 751 visits in June, 1909, the visiting nurse service provided by the Metropolitan Life Insurance Company for the benefit of the policyholders has been extended, until in June, 1912, over 76,500 visits were made. For three years the company has been providing this free nursing service in the belief that continued effort of this character will reduce the death-rate among its 10,000,000 industrial policyholders, and thus eventually return to the stockholders the hundreds of thousands of dollars invested in this manner. The number of patients visited, including duplicates, in the three years ending July 1, 1912, approximates 185,000. The number of visits made by nurses to patients amounts to over 1,500,000. These visits cost the company between forty and fifty cents each. A recent report on this subject estimates the cost for the present fiscal year at fully $500,000. While it is too soon to give any definite statistics on the decline of the death-rate, comparisons of the mortality rates of tuberculosis and some other diseases show an improvement to an appreciable degree.

The French Birthrate.

"The Paris correspondent of the *Times* states that the serious decline on the French birth-rate, which last year showed a falling off of 32,869 births as compared with 1910, has led the Minister of Finance to appoint a Commission for the purpose of investigating the causes of the decline and of suggesting remedies. In emphasizing the importance of immediate action if France is to maintain her position in the world, M. Jacques Bertillon, the eminent statistician, points out that whereas a century ago, 27 per cent. of the population of the great European powers were French, today the proportion is only 11 per cent. Formerly French was the most widely spoken language; today it is the mother tongue of only 45,000,000 as compared with 100,000,000 who speak German, and 130,000,000 who speak English. As for remedies, M. Bertillon insists that Frenchmen must be taught to regard a child as a burden which its father supports for the benefit of the whole community. But in order that a family should pay what it owes to the State it should consist of at least three children—two to fill the places of the parents when they die, the third to fill the gaps caused by those who die before attaining adult age. In order to promote this end M. Bertillon proposes a reduction of taxation upon fathers of three or more than three children, in proportion to the number of living offspring—a system already adopted in Prussia, Saxony Servia, Norway, Sweden, and parts of Switzerland. The laws of succession should be modified and formalities of marriage simplified. Mothers of large families should be assisted in various ways, and especial provision should be made for widows left with children. Finally, M. Bertillon suggests that among the humbler class of public servants those candidates for employment by the State who have children should be considered as eligible in proportion to the size of their families."—*The Medical Officer*, September 7, 1912.

Bubonic Plague.

Clinical Medicine for October, in its news notes, considers the almost pandemic character of bubonic plague. It is now present in a number of places in South America, while the latest places to be attacked were

Porto Rico and Cuba. It was thought that rats infected with plague had been discovered in New Orleans, but the United States Public Health Service was unable to verify these supposed findings. Significant as is the presence of plague so near our doors, it will become a much greater menace when the Canal is opened and the West coast of South America is brought into direct communication with our large Eastern ports. Such a prospect justifies the greatest supervision and the most aggressive measures of eradication.

Tuberculin Test in Cincinnati.

The following resolution has recently been adopted by the Cincinnati Board of Health for the protection of the public against tuberculosis from milk and for the conservation of food-producing animals:

Be it resolved, by the Board of Health of the city of Cincinnati, That the following regulations are necessary for the public health, and the prevention and restriction of diseases in the city of Cincinnati, and the same be and are hereby adopted as follows:

Sect. 1. It shall be unlawful for any person, firm or corporation to sell, offer to sell, or have in his possession for the purpose of selling or giving to any person, or persons, in the city of Cincinnati, county of Hamilton, state of Ohio, milk or cream which has not been pasteurized as hereinafter required.

Sect. 2. Milk and cream shall be deemed pasteurized within the meaning of this regulation if the same shall have been heated to a temperature of not less than one hundred and forty (140) degrees Fahrenheit, and held at that temperature for not less than thirty minutes. The health officer of the Board of Health or his assistants shall be empowered to inspect the process of pasteurization, and the premises, apparatus and conditions under which same is done. The pasteurization of milk or cream otherwise than according to the methods and processes approved by the city health officer shall not be deemed a compliance within the provisions of this regulation.

Sect. 3. The above described pasteurization shall be required in all cases except where such milk and cream is obtained from dairies in which all the animals have been proved free from tuberculosis by the tuberculin test and physical examination, and have been branded and the tuberculous animals removed as hereinafter provided.

Sect. 4. That all tuberculin testing be done under the direct supervision of the Board of Health and that same be performed only by a recognized veterinarian or state or federal authorities; all test sheets to be forwarded immediately to the health officer of the city of Cincinnati for approval.

Sect. 5. Tested cattled to be branded by a burnt brand on the hoof or a tattoo on the inner surface of the ear or a self-retaining button in the ear.

Sect. 6. All animals proved to be tuberculous by the tuberculin test to be immediately removed from the herd and the premises properly disinfected and no cattle are to be added to the herd until they have passed a satisfactory tuberculin test.

Sect. 7. No milk or its by-products of any cow showing clinical symptoms of tuberculosis or other communicable diseases shall be sold as human food in any form in the city of Cincinnati.

Sect. 8. This regulation shall take effect and be in force from and after the earliest period allowed by law.

The Dangerous Typhoid Carrier.

"A typhoid fever carrier has been discovered in Mocrestown, N. J., engaged as the manager of an important dairy farm. There was an epidemic with a record to date of thirty-two cases and one death. Investigation showed that every case was on the milk route supplied from the farm in question. This dairy was one of the best in the state, according to the inspectors' reports, and there were no records of typhoid fever at or about it. Finally a blood test was made of each man on the place, which showed that the manager had the disease. The strangest thing about the whole matter is the fact that the man did not know he was ill. He did not feel quite up to the mark on one or two days, but he did not stop work although his system was giving off the germs of the disease which caused sickness in the town and even led to the critical illness of two of his children. The case is a particularly interesting one since it shows the value of the blood test in running down the cause of an epidemic of this nature. Furthermore it shows the desirability of making an occasional test of the employees of dairies in order to be certain that no typhoid is carried by them. This may seem like an excess of caution, yet the danger from typhoid carriers is by no means fully understood and health officers are becoming more and more strict in cases where epidemic may be caused by such persons. Only recently, in fact, the health officer of a large city insisted upon a blood test of all employees of a contractor engaged on work on a dam across a river, at a site where there was some chance of contamination of the municipal water supply. It was felt that in this case sanitary precautions about the camps were inadequate and that blood tests should be made in order to become certain that no danger existed."

Engineering Record, Vol. 66, No. 7.

Air Pollution by Coal Smoke.

The measurement of the amount of coal smoke pollution of the air about English industrial cities and its effects as described by Arthur G. Ruston, Leeds, furnishes a good example of heavy pollution by smoke. In the industrial part of the city 1,900 lbs. of solid impurities are deposited annually per acre. This amount decreases with increased distance from the city, although even at seven miles there are depositied 46 lbs of impurities annually. By a method described in a preceding paper of the same author, the amount of light shut off by smoke at Hunslet, Eng., is found to be 40 per cent. of the total. It is easily seen that this would greatly hinder the growth of vegetation in that vicinity. The direct effect of the smoke on plants is the coating of the leaves with the tarry material in soot and the action of the mineral acids also present. The effect upon the yield of certain crops was tried experimentally at Hunslet and was found that only one half the crops of radishes and one fourth the crop of lettuces was obtained that should be secured in purer atmospheric conditions.

Journal of the Royal Sanitary Institute, October, 1912.

Individual Freedom.

The belated and largely vicious argument of "personal freedom" often advanced as a reason against the establishment of a National Health Department, is interestingly illuminated in an editorial in *Good Health* for September, in the following manner:

"Dr. Eugene L. Fisk, medical director of The Postal Life Insurance Company of New York, is an enthusiastic advocate of a National Department of Health. In an address sent to the policyholders of the company, Doctor Fisk says, 'Many oversensitive people are disturbed lest there may be interference by a National Department of Health with their freedom to injure themselves and their neighbors by unhygienic practices. The fact that the typhoid bacillus is free to pursue life, liberty and happiness in the Peyer's patches of 300,000 American citizens annually, disturbs them not. The American stomach has already been restricted in its freedom to receive poisoned food and the $143,000,000 worth of patent remedies and druggists' preparations that are annually prepared for its delectation, and further restriction is viewed with alarm.' "

The Moving Picture and Public Health.

The difficulty in obtaining approximately complete and reliable vital statistics and the importance of these statistics in their relationship to public health have led the Chicago Board of Health to adopt an educational measure which it is hoped will be as effective as it is dramatic. By an arrangement with one of the film companies the Department of Health contemplates, during the coming year, the presentation to the people, by means of moving pictures, of a play which shall emphasize the necessity of birth registration and which shall present, in this popularly impressive way, the misfortune which may befall an individual whose birth has not been registered.

According to the *New York Times* for October 27 the play itself presents the scene of a household in which the husband is presented with a son and heir and a fancy bull pup upon the same day. Through carelessness the boy's birth certificate is lost while the certificate for the dog is carefully registered. Later, when the boy's legacy is about to be lost owing to the failure of registration, the day is saved by the discovery that the father, in his exuberancy over the birth of his heir had written across the face of the certificate of the dog: "Became father of a fine bouncing boy on this date also." This seems to satisfy the court, and the play ends by a bit of as equally impressive positive teaching, in which the announcement of a son and heir causes the father and grandfather to fall over each other in their haste to get to the Department of Health in order to register the birth of the new arrival. Such demonstrative instruction of the public should do much in improving our very imperfect birth registration.

Fish as Carriers of Cholera Bacillus.

"Max Pettenkofer, the well-known hygienist of Munich, made the observation, years ago, that ground water played an important rôle in infectious disease; upon rising of the ground water the virulence of the disease decreased, while a fall of the water carried with it an increase. The rise of the ground water is preceded by a turbidness of the river system, when the bed of the river acts as a filter; by the fall of the ground water the river bed becomes a poor filter and the microbic organism can more easily enter the ground water. This theory enlisted as many friends as enemies, and well known is the controversy between Pettenkofer and Koch, who, in 1884, discovered the comma bacillus. Among these infectious diseases cholera is included. Drinking water, milk, fresh, uncooked vegetables, and raw fruits are considered the most common carriers of the virus, and India is taken to be the place where the disease originates; it is there endemic.

"All these facts are well known, but interesting, although not entirely new, is a theory which was promulgated for the first time about twelve years ago in Batavia, by a Swiss physician, C. O. Gelpke, who for thirty-two years served as a surgeon in the Dutch East Indies. Doctor Gelpke has returned to his home country, where he now practises, and has written a short essay upon his theory, which appears in the *Correspondenz-Blatt für Schweizer-Aerzte* for July 20, 1912. He believes that fish are great carriers of cholera and that through fish and their spawn the virus is carried from the source of the river to its mouth. He does not think that man himself and his fomites or feces play an important rôle in the migration of cholera. To diminish the danger of an epidemic, cities have now been supplied with pure drinking water and good filter stations; the drinking water is not taken from rivers flowing past cities, but from wells or rivers whose systems have been isolated. His theory is that the bacillus enters the soil, is carried to the ground water, and thence to the river, where fish and spawn receive and carry it along the current of the river. He has not been able to prove his theory bacteriologically."

New York Medical Journal, August 31, 1912.

Eugenics.

The *Survey* for September 21, 1912, presents an analysis and criticism of the first International Eugenics Congress, held in London in September. According to the *Survey* the chief characteristics of this Congress were the wide divergencies of opinion and the lack of uniformity of program. The conclusion must be reached that Eugenics is not yet a science for "the Congress was more an exchange of views and mutual instruction than a scientific body equipped to work out a platform of concerted action, with the ultimate object of proposing legislation."

However, many valuable contributions were made to the subject by men interested in this phase of biological and social effort. There were discussed the problems of physical heredity, the question of marriage restriction, the effect of militarism on the race, etc. Such authorities as Peter Kropotkin, A. J. Balfour, S. G. Smith of the University of Minnesota, and others enriched the congress by taking part in the discussions.

Consumptives and the Southwest.

The September *Bulletin* of the Massachusetts State Board of Health presents a letter from Gov. O. B. Colquitt of Texas, to which the Southwestern Conference on Tuberculosis is attempting to give as wide publication as is possible. The letter contains resolutions adopted by that Conference in April, 1912, informing consumptives of the already overtaxed condition of state and charitable agencies in the Southwest and advises invalids coming to the Southwest to have funds sufficient to carry them through at least one year. It announces the absence of public funds and free hospitals, the limited facilities for non-strenuous employment, the exhausted patience of private individuals who might otherwise give assistance, and further asks that physicians, churches, lodges, labor unions, charitable organizations, and railroads become cognizant of the facts before urging or aiding the migration of invalids to this section.

Maternity Insurance.

The *Survey* for October 19 states that the new Italian Maternity Insurance Law has greatly reduced infant mortality among industrial workers. The law provides that all women in industries between fifteen and fifty years of age must belong to a maternity insurance fund, the contributors being the employers and the employees. Mother and child are cared for at least one month after the birth of the infant, and factory owners are compelled to provide a decent room in which mothers can attend to their babies and nurse them. Many large factories have attached a day nursery with a nurse in charge.

Sex Hygiene.

At the annual meeting of the American Federation for Sex Hygiene, held in Atlantic City, June 3, 1912, Dr. William F. Snow, secretary of the California State Board of Health, in an address entitled "Weighing the Evidence" summarized very effectively the conflicting views held by persons interested in the sex hygiene movement in the following way:—

1. Those who believe in educational measures and the establishing of moral standards.
2. Those who lay special emphasis on the administrative control of prostitution, either by segregation or non-segregation methods.
3. Those who adhere to temperance and church affiliation as ultimate solution.
4. Those relying on marriage restriction and eugenics.
5. Those reactionaries who believe that the lesser evil is to leave the problem alone, fearing that all effort will but arouse morbid curiosity.

He further outlined what he considered to be scientifically and morally sound activity on the part of a health department in this field:—

1. Declare syphilis and gonococcus infections communicable and dangerous diseases.
2. Make all cases reportable by physicians or laymen.
3. Publish all trustworthy information about the prevalence and spread of these diseases.
4. Isolation and supervision as far as public sentiment will allow, of all cases.

He said that the state of California in its attempt to carry out these measures, was meeting with a fair degree of success.

The Failure of Model Tenements.

An article in the *New York Times* for October 27 by Mr. Henry Atterbury Smith, architect for the Vanderbilt tenements at 78th St. and Avenue A, and member of the Tenement Economics Society, presents the causes for the failure of the so-called model tenement, as at present constructed and managed, to solve the problems for which they were designed. Mr. Smith also discusses measures which he considers necessary of fulfillment if this attempt to ameliorate housing conditions is to be a success.

One of the factors in the failure of this form of philanthropy which Mr. Smith points out is the fact that unnecessary expense and luxury are involved in the construction of the buildings, resulting in rents which the people for whom they were constructed are unable to pay. Owing to the increased value of the land in the immediate vicinity of the model tenement, rents are raised in the neighborhood, and thus in an indirect way a hardship falls upon those people for whose benefit the tenement was designed.

Mr. Smith further points out that the present tenement house law, though admirably administered, is too strict in many of its requirements. Its insistance on at least seven feet in the width of the rooms, its demand for space for vent-shafts, which the open-stair tenement has made unnecessary, and the amendment requiring that bath rooms be placed on the street front or outer yard are examples of uneconomical and unintelligent legislation. He suggests that the administration of the law be taken from the hands of the private organization which now has it in charge, namely, the Tenement House Committee of the Charity Organization Society, of which he is a member, and be given to a board, public in character, and made up of charity workers, architects, builders, physicians, real estate brokers, and insurance men. This board could more carefully weigh the conditions and the legal requirements and more rationally and effectively provide for the man who cannot pay more than $10 a month for rent and who is now compelled to live with his family in the filth and darkness of the old houses.

Infant Mortality in Canada.

The Medical Officer for July 27, 1912, presents an abstract of the report of Dr. Helen MacMurchy on infant mortality in the Province of Ontario. The investigator finds that a most deplorable condition of birth registration exists in this province, the registration not being over 75 per cent. of the total births, while as many as 20 out of 636 births in Toronto were registered twice. The causes given are the lack of training of the inhabitants in the necessity for registration, the fact that the registrar receives only twenty cents for each registration, the non-compensatory notification by the doctors, and the absence of prosecutions in default of registration. The infant mortality rate in 1907 was 120 per 1,000 births in Ontario, and 148 per 1,000 in Toronto.

Besides the remedy of the above causative factors, Doctor MacMurchy recommends the payment of mothers by the Provincial Government for the nursing of their children and the establishment of a bureau of infant care under the Board of Health.

English Isolation Hospitals.

The conditions of hospitals for infectious diseases in England is the subject of a report by Dr. H. Franklin Parsons, till last year a member of the local government board, a report so well esteemed in his own country that it is selected for subject of editorial comment in the *Lancet*. *The Clinic* has from time to time noted the conditions existing in American hospitals and the opinions of experts with reference to their construction and arrangement, so that the English report will be interesting in the way of comparison.

The isolation hospital has come to be so familiar a feature of sanitary administration that it is taken as a matter of necessity. It is true that the belief in its efficacy in actually stamping out disease has been modified somewhat, since it is becoming evident, even to the most sanguine, that fighting disease is a long story of continued, unremitting watchfulness. Hospitals have been found to have their own risks in the way of return cases and cross infection and sometimes, when a hospital has been permitted to become overcrowded and understaffed, it has been impossible to rate it very high as a help either to patients or to the people.

One difficulty has been to speak of such institutions as given over to the isolation of children with scarlet fever, and the low death rate—both within and outside the hospital—has suggested that there is little need of them and it has been urged further that the money spent on such institutions might be better employed in some wider means of prevention. The advance of knowledge has wrought much change in the place of the hospital and in England isolation hospitals are rather institutions for the reception and treatment of cases of infectious disease. Less strain is laid on being able to accommodate every case during an outbreak than in having it at all times in constant use for a wider range of infectious diseases or suspicious cases. Measles and whooping cough, which were till lately seldom admitted to the hospital—save in a few institutions in Scotland—are now habitually taken in the larger hospitals. Puerperal fever and erysipelas are now frequently cared for and the treatment of tuberculosis is certain to extend in the future.

The changes in method have been followed by changes in construction. In any isolation hospital, the many-bedded ward is now indispensable. It is necessary when there are many cases of the same disease during an outbreak, while it may in some cases be safely used for more than one malady. It is, however, necessary to supplement the large wards with a number of smaller wards, cubicles or observation beds, which serve to separate individual cases without undue strain upon the staff. Open-air wards are increasing in number. With copious ventilation, "barrier" systems have been used in hospital wards with comparative safety among a number of different infections.

Doctor Parsons suggests that floor area and wall space be taken for a better standard of capacity than actual cubic contents. He suggests the relaxation of the legal 2,000 cubic feet per bed of 1,872 feet, 144 of floor and 12 running feet of wall being satisfactory. Some modifications of existing regulations are desirable in view of new and efficient materials and methods of building.

This authority finds that the forty feet required between ward buildings and between the buildings and the boundary of the hospital lot should be maintained. It is true that occasionally circumstances would make the full distance not necessary, but it is better to have a standard, since much discussion may thereby be avoided. The requirement that a smallpox hospital shall not at the same time be used for other diseases seems to Doctor Parsons reasonable and he agrees that it shall not be within a certain prescribed distance of populous neighborhoods. Temporary buildings are not countenanced from the fact that while they have a certain apparent convenience, the economic advantages are illusory. They are affected by the elements, subject to risk from fire, and the price is usually without site, fittings, water supply or furniture. It has not infrequently happened that a building listed at $2,000 has cost $5,000 to establish, fitted for its work. Last of all, this authority suggests to small places to combine for hospital purposes and thus secure one good institution instead of three or four small and inefficient ones.

"*The Clinic*," *Boston Transcript*, November 6, 1912.

The English Birthrate.

Comments on the falling birthrate in England are found in the November 2 issue of the *Journal* of the American Medical Association. It would seem that the English are facing a situation similar in kind, if not in degree, to that of France. It is interesting to note that the decline in birthrate is paralleled by a lowered marriage rate, deathrate, and rate of infant mortality. Another interesting thing which the statistics show is the relationship of the birthrate to the different religions and races represented in England. The greatest decrease is among the constituency of the Anglican Church, while the families of Roman Catholic faith maintain an almost normal level. The Irish birthrate shows an actual 3 per cent. increase. From an economic standpoint the greatest falling off is among the thrifty skilled artisans and the upper and professional classes. As to the figures themselves, the 1910 total births were the lowest since 1890, and the rate, 26.19 per 1,000, the lowest on record.

Flyless Bavaria.

News Notes in *Life and Health* for October contains the following:—

"It seems people know how to handle the fly problem in Bavaria. An enterprising American firm wrote to the United States consul in that country, offering to send samples of a new warranted-to-stick fly-paper that might be distributed in Bavaria, in the hopes of promoting sales. The startling answer was returned that there was no market for fly-paper in Bavaria, as there were no flies. The fact is the people there are so extremely clean in the matter of vacant lots, playgrounds, stables, etc., that flies would starve. It might be a good place to go for a summer vacation."

A Clearing House for Public Health.

The necessity for some organized system of correlation with regard to the various health department publications is pointed out in the following way in the Senate Memorial on the Conservation of Human Life:—

"At a recent convention of New York State sanitary officials, at which it was brought out that 'a majority of health departments throughout the country are not properly equipped,' Mr. Robert Lynn Cox, counsel for the Association of Life Insurance Presidents, said: 'Hundreds to whom I have written for copies of their reports have replied that they are not allowed sufficient money to print reports.' Mr. Cox urged that a 'clearing house of health departments' be established in order that each health department may know the methods, latest and best, used by health departments in other cities.

"Dr. Ernst J. Lederle, commissioner of health for New York City says:

" 'I would say there is certainly need of a central bureau in which certain information concerning public-health work could be obtained. If the bill now before Congress for the establishment of a National Health Department is passed, this would probably completely meet the demands. At the present time, if we desire information concerning the activities of other health departments, we are compelled to write to each one of them individually. This was illustrated in the case of the recent adoption of sections of the sanitary code of the board of health of the city of New York in relation to public drinking cups and the common roller towel and in studies on the administrative control of venereal diseases and on the occurrences and distribution of cerebro-spinal meningitis, poliomyelitis, and smallpox, in each of which instances the department was obliged to communicate directly with a number of other health departments."

VOL. II. DECEMBER 1912 No. 12

AMERICAN
JOURNAL OF PUBLIC HEALTH

THE NEED FOR MORE ACCURATE DATA IN REFUSE DISPOSAL WORK.

RUDOLPH HERING, D.Sc.,
Consulting Engineer, New York.

Read before the Sanitary Engineering Section, Annual Meeting of American Public Health Association Washington, D. C., September, 1912.

In olden times all city refuse that could not be utilized was generally dumped at unobjectionable places. It could be dumped mixed, and, therefore, could also be collected together. Waste food, if suitable, was fed to animals and collected separately. The rag picker was also allowed to separately collect and remove all salable articles.

At the present time the conditions of town life have changed. We can no longer utilize most of the rejected food matter for feeding, except in small towns. We now discard more rubbish, our fuel varies more as to its kind and the quantity used, we can no longer use the older and crude methods of collection and delivery, we have materially increased the distances to which refuse must be delivered and we are abandoning the disposal by dumping except with ashes.

The problem of refuse disposal has, therefore, become more complex than formerly, and this complexity may not yet have reached its limit. In order that correct solutions for the test methods of disposal may be found, both from the standpoint of sanitation and economy, it is necessary to inquire into details far more than formerly, so as to have more definite facts and figures with which to solve the problem. The more accurate information now required is necessary for the varying special conditions existing in different communities. In short, we must have more special data and statistics before we can indicate the best methods for the disposal of a particular town's refuse.

At the outset we should know what the refuse consists of, and ascertain and discriminate between its various parts, which may be enumerated as being garbage, dead animals, night soil, manure, street sweepings, ashes and rubbish.

There are in satisfactory use in the different cities of the world, five different methods of refuse disposal, namely, incineration, reduction, burial or plowing into ground, dumping and feeding.

Garbage may be incinerated, reduced to grease and fertilizer, buried or fed to pigs.

Dead animals may be incinerated, reduced to grease and fertilizer, or buried.

Night soil may be incinerated, buried or plowed into the ground.

Manure and street sweepings may be incinerated or plowed into the ground, or sometimes simply dumped on land.

Ashes may be used for incineration, on account of the percentage of unburned coal which they usually contain, or used for land making by dumping.

Rubbish must be incinerated.

Next, we should know the quantities and have an analysis of each kind of refuse, so as to determine its calorific value, if the disposal is by incineration; the fat and grease value of garbage, if disposed of by reduction; and the degree of resistance of the organic matter to putrefaction and to other forms of decomposition. Such data will aid in judging the availability of the several methods of disposal.

We also need data regarding cost, not only of converting each part of the general refuse into valuable products, or of other dispositions, but of collecting and delivering the materials from the point of origin to that of final disposal.

All this information is essential to form a judgment both as to the efficiency of the disposal and as to its total cost. It would be surprising to many to see how materially the total cost may be affected by the length of haul and the character, time and frequency of delivery, and how this cost of collection may affect the economical choice of the method of disposal.

Another set of data, that would assist in planning for the best method of collection, refers to the house treatment of the refuse. When we consider the disposal of only the three most important parts of the refuse, namely, garbage, ashes and general rubbish, the design of the house cans and collecting wagons and the cost of the collection will be materially different, if we have a combined collection of all refuse, or a two-can collection (one containing only garbage), or a three-can collection (one can containing only garbage, another only ashes).

In compiling statistics such as have been mentioned, and for the purpose of getting from them the greatest possible good, it is essential, further, that the routine reports from different cities should be annually summarized in some standard form so that proper comparisons may be made.

With such accurately compiled data cities would be enabled to dispose of their refuse, not only more efficiently, but also more economically for the same degree of efficiency attained.

REFUSE MATERIALS.

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Winnetka, Ill.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C. September, 1912.

The fundamental consideration in refuse disposal must be the materials to be dealt with. No investigation on which designs are to be based can properly be made unless accurate data relative to the refuse materials to be handled are available. Therefore, any meeting of engineers where the refuse problem is to be discussed should be started with a discussion of refuse materials. Such a discussion should include the following points:

(1) The definitions of refuse materials.
(2) The classification of these materials.
(3) The quantities of refuse.
(4) The proportions of refuse.
(5) The composition of refuse.

(1) No discussion is complete unless the fundamental terms of the subject under discussion have been made clear. There is, unfortunately, a considerable difference in different localities in the meaning of the various words used to describe refuse materials. Broadly speaking, refuse is the solid waste resulting from the organic life of a community. The general term "Refuse" includes the following kinds of refuse:

1. *Public refuse*, which is the cleanings from public streets and alleys, includes snow, street sweepings, leaves and waste building materials piled on the streets.

2. *Trade refuse* is the solid waste coming from commercial processes in factories and business establishments and includes steam ashes.

3. *Stable refuse*, or manure.

4. *Market refuse* is trade refuse chiefly made up of garbage and rubbish and is separately classified on account of its special qualities.

5. *House refuse* is chiefly garbage, ashes and rubbish from houses, stores, schools, churches and such other establishments as do not themselves dispose of the waste products of their own activities.

(2) Many of the materials which go to make up these different classes of refuse require no further definition. Such are snow, street sweepings, leaves and manure. However, on account of their great importance it is necessary to give closer definitions for garbage, ashes and rubbish. These have been defined satisfactorily as follows:—

Garbage is the organic waste matter, both animal and vegetable, coming from houses, kitchens, restaurants and hotels including the natural content of moisture and the tin cans in which portions of the animal and vegetable matter have been contained.

House ashes may be defined as the residue from fires in houses, schools, churches, stores and small business establishments and also includes other inorganic materials such as glass, crockery, metallic substances, dirt, dust and bricks.

Rubbish consists of wood, paper, rags, bedding, excelsior, straw, leather, rubber, old furniture, boxes and barrels.

These materials as defined are classified in Fig. 1 which, with some modifications by the writer, was taken from "Municipal Refuse Disposal" by Mr. H. DeB. Parsons.

It would be advisable for the American Public Health Association to standardize these definitions and these classifications and to publish their standardizations in such form as to make them available for the use of all cleansing superintendents.

(3) Having defined the various kinds and classes of refuse materials it is necessary that the quantities in which they are produced should be determined. These quantities will vary from one locality to another depending upon the climate, the character of the people, the economic location, and the efficiency of the cleansing department. However, no records bearing on the quantities of refuse yield the best results unless they are arranged in all communities according to a standard form. An average daily quantity of refuse in yards and tons for the summer and winter for the separate materials such as garbage, ashes, rubbish and manure should be recorded. In order to make allowance for the difference in the number and character of the people these recorded quantities should be reduced to "Pounds per thousand population per day" and "Pounds per capita per year." It would be advisable to determine these last figures on the basis of 312 days per year.

(4) The proportions in which the various ingredients are found in refuse should also be determined for the different seasons and differing districts in any one community. Therefore, the data should be recorded showing the percentage proportion of garbage, ashes and rubbish in house refuse for each month of the year. Such data is of the greatest importance in the design of a reduction plant or refuse incinerator. Under this heading there should also be included the weight per cubic yard of refuse material recorded in such form as to show seasonal variations, and the differences due to the character of the population.

(5) Although less important than the quantities and proportions of refuse materials, the composition, nevertheless, in many instances has a controlling influence upon the design of the disposal works.

The composition of refuse may be determined by a physical or so-called "mechanical" analysis and by a chemical analysis. The mechnical an-

Fig. I.

Classification of Refuse Materials

- Municipal Refuse
  - Public Refuse
    - Animal Manure
    - Pavement Dirt
    - Snow
    - Droppings from carts
    - Waste building materials
    - Leaves
  - Trade Refuse
    - Dry factory waste
    - Steam ashes
    - Rubbish from office buildings and factories
    - Slaughter house waste
    - Cleanings from private catch basins
  - Stable Refuse
    - Straw
    - Horse Droppings
    - Cleanings from stables
    - Fly Maggots
  - Market Refuse
    - Garbage from markets
    - Rubbish from markets
    - Old boxes and barrels
  - House Refuse
    - Garbage
      - Animal matter
      - Vegetable matter
      - Moisture
      - Meat and bones
      - Fruit
      - Tin cans
    - Ashes
      - Coal
      - Dust
      - Glass
      - Crockery
      - Metallic Substances
      - Brick
    - Rubbish
      - Boxes and barrels
      - Wood
      - Paper
      - Rags
      - Beddings
      - Excelsior
      - Straw
      - Leather
      - Rubber
      - Old furniture

alysis shows for garbage, ashes, rubbish, etc., the percentage proportion of such materials as vegetable matter, bones, glass, paper, rags, metals, wood, dust, excelsior, crockery, etc. An analysis of this sort is useful in determining the quantity of salable material which can be picked out from the refuse. The chemical analysis should show for all classes of city refuse the percentage proportion: first of carbon, water, true ash and volatile matter; and second of water, grease, tankage, ammonia, potash and lime. The first analysis will show the value of the material analyzed for incinerating purposes. The second analysis will show the fertilizing value of the material, after the extraction of the grease. I have never seen any analyses recording the food value of refuse for disposal at piggeries. Tables for recording statistics of refuse materials in accordance with the above requirements were presented to this association by the writer at the annual meeting in 1911. If the data covered by these tables were available for a number of years from any particular community, they would furnish sufficient information for a thorough-going investigation with recommendations as to the efficiency of the existing methods of refuse collection and disposal; and for improvements should they be necessary.

The comparison by one cleansing superintendent of the data so gathered in his own community, with data gathered and similarly recorded from other communities, would serve as a valuable check upon the efficiency of operation of the local department.

Such data is scarce at the present time. It is hoped that these forms and tables for statistics will be arranged and brought into use by the American Public Health Association so that satisfactory data may be gathered for use in the future.

THE HOUSE TREATMENT OF REFUSE.

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Commissioner of Health, Minneapolis, Minn.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

A recent article upon the handling of city waste says: "Investigations for municipal refuse disposal are commonly made to include, first, the collection, and second, the disposal of refuse. To these two lines of investigation, however, a third one should be added, namely, the treatment of refuse in backyards and alleyways."

The house treatment of municipal refuse is the first step towards final disposal and is the most important one. The educational effect of a proper system of house treatment can be made to influence the householder in the direction of improvement in a sanitary way along other lines. The fact that many complaints arise from the condition of the can itself emphasizes the importance of proper methods at the home. Garbage becomes a nuisance under certain conditions. These conditions are its composition, its moisture, the degree of exposure to air and to flies, the amount of mixture with ashes and other refuse, the character of the receptacle, frequency of collection, etc.

The composition of garbage is well known to be the animal and vegetable refuse arising from the operations of housekeeping. The moisture under ordinary conditions ranges from 80 to over 90 percent. It is now well recognized that flies breed in large numbers in decaying animal and vegetable matter as well as in manure. The amount of mixture with other forms of refuse depends upon the rules of the municipality regarding primary separation by the householder, and these are determined largely by the method of disposal. The character of the receptacle has progressed from wooden bins or boxes to pails and, finally, to metallic cans with metallic covers. Frequency of collection depends almost entirely upon the condition of the can—foul cans and frequent collections always go together. The method of disposal determines largely the size of the can, the amount of primary separation, the frequency of collection, and the amount of nuisance in the can itself.

Household separation varies from one can to hold all refuse to two cans, one of which is used for garbage and rubbish, and the other for ashes, tin cans, etc.,—or, in some instances, one for garbage, the other for ashes and all forms of rubbish, including paper, tin cans, etc.,—or to three cans, one for garbage, one for ashes, and one for rubbish.

The most important point to be attained should be an absence of any nuisance about the home and about the can. This may be done by draining garbage of all moisture and wrapping it in paper before placing it in the can. This insures cleanliness in the home, in and about the can; also ease of handling, both in hot and cold weather; prevents the develpment of flies, and tends toward cleanliness all the way from the drain in the kitchen sink to the ash pile at the disposal plant. It is commendable also on account of the simplicity and ease of adoption.

By insuring a clean can that is without moisture, it makes for a clean back yard. As the back yard becomes clean, neat and without odor or nuisance, the next and most natural step is the planting of vines or shrubs, so that the can may be shielded from sight, so there can be no offense to the eye. Everything of waste being placed in cans and nothing thrown out, the alley soon becomes passable, and assumes the well-kept appearance of the street. It is assumed that the location of the can pertains to the collection part of this discussion. While the can remains on the premises, however, it should be at the back of the lot.

The garbage should not be mixed with ashes for several reasons; first, it is not necessary to collect ashes as often as garbage; second, in the majority of cities garbage and ashes require separate handling and a different method of disposal; third, garbage with its moisture when mixed with ashes will freeze in the can in the winter time, retarding collection and mutilating the can. The wrapping of garbage permits also of a clean method of handling household rubbish. The most important result, however, of proper separation, draining and wrapping, is the educational effect upon the householder. The lessons of "contact," "fly-infection," "rat-breeding" and other up-to-date sanitary teachings become easy and are readily learned and adopted.

Rubbish should be kept with dry wrapped garbage, or if collected separately, in a gunny-sack within a can, the sack to be tied and removed, and an empty sack put in its place.

Ashes should be kept in cans together with the broken glassware, tin cans, etc. The size of the cans for garbage, rubbish and ashes varies with the frequency of collection, and ranges from ten to thirty gallons.

Manure should be kept in water-tight, screened boxes or pits, and removed within the incubation period of the fly.

The whole object of the house treatment of refuse should be to avoid nuisance or offense to the eye or the smell at the house; to minimize nuisance and expense in the service of collection; to fit into a system of disposal that shall be without nuisance, in fact, to have no nuisance at any point; and to educate the householder in habits of cleanliness. In these days of sleeping porches, lawn tents, and open air living, isn't it worth while?

COLLECTION OF MUNICIPAL REFUSE.

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Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C.
September, 1912.

The collection of muncipal refuse is one of the most important parts of the general problem of refuse disposal and should be so considered, instead of as a problem by itself. It affects a larger proportion of the population more directly than do the works for the final disposition of the refuse, and the cost of collection is frequently more than the cost of the final disposition. The financial aspect of collection is often looked upon as the most important, and while it is of great importance, still, due consideration should be given to the sanitary and æsthetic sides of the question. The relative importance of each will depend upon local conditions.

The treatment of the refuse at the house should, first of all, be consistent with cleanliness, as nuisances in yards and alleys may affect more people than either the collection or the disposal of the refuse. It should be simple and easy of adoption and should favorably affect the cleanliness and economy of the collection system.

There are advantages in having a standard type or types of receptacle for an entire city, the number of types depending of course on the nature of the collection, whether separate or combined, but this is not essential. The receptacle should, however, be of durable material, should have a tight fitting cover, and, in general, its weight, when full, should not be greater than that which can be handled by one man. If receptacles holding garbage or other refuse containing a large amount of water are kept in covered, lined pits below the surface of the ground, their contents are not likely to freeze in winter. There is a further advantage with this arrangement in that the collector can find the receptacle quickly and easily. Again, there is less chance of the receptacle being stolen. With night collection, on the other hand, it may be found desirable to have the receptacles placed at the street line.

At Minneapolis, Minn., it is said that the wrapping of garbage in paper prevents objectionable odor, keeps away the flies, and in winter prevents the garbage from freezing and adhering to the receptacle.

The frequency with which refuse is collected will depend on local conditions, character of refuse, climate, and method of collection, and will often vary with the season. In any event the refuse should be removed from the premises before it accumulates to the extent of becoming a nuisance.

In some American cities, especially in the congested portions, garbage is removed daily. At Columbus, Ohio, it is collected twice a week in summer and once a week in winter, and at Minneapolis, where the garbage is wrapped in paper, once a week at all times of the year has been found sufficient. In Boston, Mass., and Rochester, N. Y., ashes are collected once a week, and in the cities in England and on the Continent, where the garbage, ashes and rubbish are collected together, collections are, in general, made three times a week.

The length of haul depends on many factors, important`among which may be mentioned the topography of the city and the location of the disposal works. At Columbus the long and short haul system has been adopted each team traveling the same total distance each day, about sixteen miles. In other cities, among which are Atlanta, Ga., and Seattle, Wash., it is being found desirable to provide loading stations throughout the city, to which the refuse is delivered by the collecting wagons and from which larger vehicles transport it to the point of disposal.

The question of collecting refuse at night instead of during the day should also receive consideration. Its advisability depends largely on local conditions and may vary even in different sections of the same city. In Milwaukee, Wis., it was adopted in order to lessen the nuisance from odor and dust. In Cologne, Germany, it has been abandoned because of the noise made by the wagons during the hours when people wished to sleep.

The relative merits of the separate collection of each class of refuse or the combined collection of all classes, *i.e.*, ashes, garbage and rubbish, should receive careful consideration, but the system to be adopted must, of necessity, depend on the method of ultimate disposal.

The separate collection is now in use in many American cities, particularly at those places where the garbage is disposed of by the reduction method, and in some cities, where there is a large foreign element in the population, it has been found difficult to get a complete separation of the several classes of refuse. Separate collection will be found in many instances to be less convenient at the house, more complicated and more expensive than the combined collection.

The combined collection of all classes of refuse will usually prove to be cleaner and to have fewer objectionable features, and with this system it should be easier to secure and keep a better grade of employees. The mixing of garbage with the rubbish and ashes will prevent, in a large measure, the blowing around of the latter, will lessen the dust nuisance, and indirectly may lessen the cost of street cleaning. The decomposition of the garbage is far less noticeable and, from the point of view of preventing a nuisance, the receptacles and wagons will not require such frequent cleaning nor would it be necessary to collect the refuse at such frequent intervals.

The fly nuisance is also reduced to a minimum and there is less likelihood of odors if the refuse is stored pending its final disposition. As but one type of wagon is required the system is probably easier to adopt and easier to enforce, fewer regulations being necessary. On the other hand, its adoption may in certain cases increase the cost of ultimate disposal. Where the refuse is incinerated, for example, it may be more expensive to burn all the ashes with the garbage and rubbish than simply to burn the garbage and rubbish with enough ashes to produce proper incineration, and dispose of the remaining ashes otherwise. The combined collection is now in use at Seattle, Wash., West New Brighton, New York City, and Atlanta, Ga., as well as in other American cities.

It is possible that it may be found advantageous, in some cities, to adopt the combined system of collection in certain districts and the separate collection in other districts, depending, of course, on local conditions.

The type of vehicle best suited for collecting refuse depends on the method of collection and other factors. Consideration should be given to ease of loading, emptying and cleaning, to provision against leakage, dust, odor and general unsightly appearance, to the question of noise during loading and when in motion, and to durability, first cost and cost of maintenance. The capacity of the vehicle is influenced by the length of haul, the frequency of collection and the topography. The garbage wagons at Columbus and Minneapolis hold 1.3 and 2 tons, respectively. At Seattle, where ashes, rubbish and garbage are collected together, the new wagons hold five tons. Properly arranged canvas covers have been found, in some cases, to have advantages over covers of wood or metal.

In New York City, where refuse is collected separately, a new type of collection vehicle is now being tested. The body is swung low on the running gear, with dumping ledges three feet six inches above the pavement, and is pivoted at one end to facilitate dumping. It holds nine cubic yards and is divided by a cross partition into two compartments, one for ashes and one for garbage. The relative capacity of the two compartments can be varied, by shifting the partition, to meet the seasonal variations in the quantity of each class of refuse.

At Zurich, Switzerland, the collection vehicle consists of three large, covered boxes set on a common running gear. After filling, the wagon is hauled to the incinerator where the boxes are lifted by a crane onto the automatic charging apparatus, the refuse dropping through the bottoms of the boxes into the furnace. By this arrangement the refuse is not exposed after it has been dumped out of the house receptacle and into the boxes of the collection vehicle. In Hamburg, Germany, electrically operated automobile trucks have been in use for a number of years. They cost about $3,800 each, weigh 11,000 pounds and hold three tons. Each truck is operated by two $4\frac{1}{2}$-H.P. electric motors, the storage batteries being recharged every day. One truck averages four trips in eight hours and covers a total distance of about thirty-five miles. The operation is very simple, one man being necessary to run the wagon and make the collections. The body is separate from the truck and, when full, is lifted by a crane at the incinerator and emptied into the storage bins. The cost of operating these trucks, exclusive of labor, superintendence and fixed charges, is given as $9\frac{1}{4}$ cents per mile or 27 cents a ton, a little less than half of the total being for tires.

Motor trucks for refuse collection are also being used in the United States. In Atlanta, Ga., for example, gasoline driven trucks, holding $1\frac{1}{2}$ and 3 tons each, have been employed for more than a year. The chassis costs $3,750 and the body of the wagon about $100. These trucks have proved very satisfactory, making six to eight trips a day and covering twenty-five miles. Each truck has a driver and two helpers, the former receiving $16 and the latter $9 each per week. At Seattle, 5-ton gasoline-driven trucks are being used with success to haul refuse from the loading stations to the point of disposal.

Information of value relative to the cost of collecting refuse is not easily obtainable, one of the reasons being that distinction is seldom made between the cost of collection and the cost of disposal. This is unfortunate, because the cost of collecting refuse is a very large part, estimated at 85 percent. in Seattle, of the total cost of collection and disposal. Cost data should be complete and due allownace should be made for proper interest charges on all capital outlay for equipment and other items.

The cost of combined collection at Seattle varies from $1.84 to $2.84 per ton, exclusive of superintendence and fixed charges. Superintendence amounts to 15c per ton. The net cost of incineration of the refuse is reported as only 52c to 70c per ton.

In Columbus, the cost of labor, equipment, repairs, inspection and superintendence for the collection of garbage amounts to $1.60 per ton, which, with fixed charges of 50c per ton, make the total cost of collection $2.10 per ton. The cost of collecting rubbish, exclusive of fixed charges, is reported as 54c per cubic yard, or, on the basis of 250 pounds per cubic yard, $4.32 per ton.

In Boston, Mass., in 1907, the cost of collecting ashes by the city is reported as $2.30 per ton-mile, exclusive of fixed charges, and for collecting garbage $2.18 per ton-mile.

The cost of collecting garbage in Minneapolis is said to be about $1 per ton, and in Atlanta the cost of collecting mixed refuse is estimated at $1.12 per ton. Pittsburgh spends $3 a ton for collecting and disposing of its rubbish and pays a contractor $2.25 per ton for collecting and removing its garbage.

The cost data cited give a general idea of the expense of collecting refuse in several cities, but without an accurate knowledge of local conditions they cannot be safely used as a basis for estimates in other municipalities.

City ordinances and regulations relating to the collecting of refuse should be definite and consistent with each other, and there should be no uncertainty as to which department of the municipal government is responsible for their enforcement. A point of considerable importance and one which should be made clear in the city ordinances, is whether the occupants of property, or the property owners, shall be held responsible for the proper treatment of the refuse at the house.

As a general rule, the best results may be expected from municipal ownership and operation of the collection equipment. If the work is done by contract the regulations regarding collection should be strict and well enforced. In any case the collectors should be well-paid men who will take some interest in their work and, where possible, one man should always have the same route, so that he will become acquainted with the district and the house holders.

It will often be found advantageous, especially at first, to have district foremen whose duty shall be to inform the residents regarding the municipal ordinances and regulations and to generally improve the service.

SYSTEMS OF COLLECTION AND DISPOSAL OF GARBAGE IN CITY OF NEW ORLEANS.

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Commissioner of Public Works, New Orleans, La.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

The city of New Orleans is divided into seven municipal districts,[1] each district is divided into wards and each ward sub-divided into garbage collection districts. To each of these garbage collection districts the Department of Public Works assigns one of its garbage collection carts. These carts are the one-mule, two-wheel kind, with a capacity of $1\frac{1}{2}$ cubic yards and are kept busy collecting garbage from 7 o'clock a.m. to 5 o'clock p.m., or until such time as it will take to collect all garbage.

These carts serve approximately 74,600 families and haul on an average a distance of one and one-half miles to the dumping ground.

Kitchen refuse is collected daily with the exception of Sundays and Thursdays. Thursdays are set aside for the collection of dry matter, such as broken crockery, glassware, tin cans and ashes.

All garbage collected throughout the front section of the city is hauled to garbage stations located along the river front at five different and easily accessible points, dumped into steel garbage cars and thoroughly disinfected after which a tarpaulin cover is tightly drawn over the cars to prevent unpleasant odors from emanating while passing through the city. These cars are hauled away at night by the public belt railroad to what is known as the "inter-change." From the interchange they are taken by the New Orleans and North Eastern Railroad Company to what is called the main dump, a very low and swampy place located in the extreme rear of the city, where the garbage is emptied and spread by the employes of this department, the process of which is very interesting and is as follows: On arrival of the large cars on the main track the garbage is dumped into smaller cars on a portable track. These small cars are drawn by a gasoline engine out on this extension portable track and emptied. This track extends about 800 feet on each side of the main track, or trestle. To prevent congestion alongside of main track of garbage not placed in smaller cars the department has a steam digger employed to remove this surplus. This digger is worked by means of a derrick and orange peel bucket, picks up the garbage from alongside of the track, or trestle work, and empties it out into the swamp, a distance of about forty (40) feet from the trestle work. This dump is also equipped with an electrical pump for the purpose of flushing cars after they are emptied.

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[1] Area covered daily by garbage carts, 35 square miles.

The garbage which is collected throughout the rear section of the city is hauled to different dumps located in the extreme rear of the city and accessible to carts. These dumps, of which there are eleven, consists of old unused drainage canals and swamp lands.

To dump in these low places and canals the sanction of the City Board of Health is obtained, and by the use of powerful disinfectants in a liberal manner, fermentation is prevented and the garbage rendered odorless and harmless.

Through the dumping of garbage into old unused drainage canals and low places, leveling same and surfacing with city waste, manure, street sweepings and street pilings, many of these low places have been transformed into beautiful parks, healthful playgrounds for children and good streets, all of which is a big asset to a city.

THE DISPOSAL OF MUNICIPAL WASTE BY THE BURIAL METHOD.

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Commissioner, Board of Public Works, Davenport, Iowa.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

The city of Davenport, Iowa, with a population of approximately 45,000- lies on the west bank of the Mississippi River, with its business and manufacturing districts in the valley, and its residential district on the adjacent bluffs, the latter at a distance varying from one fourth mile to one mile, from the banks of the river.

Up to the season of 1910 the city disposed of all its garbage and night soil by means of the simple, economical and rather primitive method of dumping in the river and allowing the current to carry the deposits away.

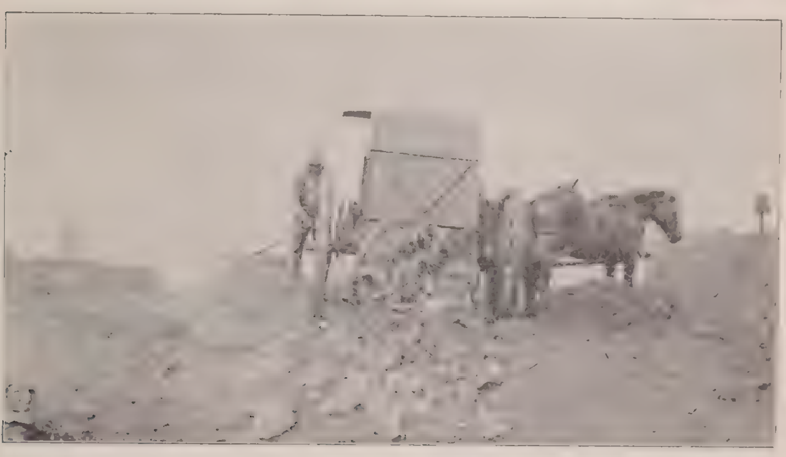


Fig. 1.—Showing wagon dumping over face of bank and piles of covering material on either side.

A dock barge and a hopper bottom barge equipped with flushing pumps and a gas engine winch was used. The garbage wagon drove directly on to the hopper barge and dumped by gravity through traps into the hopper. Twice a day this barge was worked out about 1,000 feet from shore by means of a chain, anchored at each end and passing through the winch on the barge. When out to a point where the river was deep and the current swift, the hopper bottom was sprung and all refuse released and allowed to either sink or float away down stream. Fortunately, the general set of the current tended to prevent any offensive matter from depositing on the bank of the river within or adjacent to the city limits.

During that portion of the year when the river was frozen over, the garbage was hauled and dumped upon the ice and carried away in the spring; this period ordinarily lasted from about January 1 to February 26.

Early in May of 1911, the War Department of the United States government notified the city to cease, within ten days, dumping all refuse in the river. Hurried meetings were held, and after numerous consultations and investigations the writer advocated a trial of the burial method of disposal. Mr. John W. Alvord was employed to make a report on the most feasible and economical method of handling this question and his report recommended a thorough trial of the burial method.

Fig, 2.—Covering garbage. Retaining wall partially completed.

The city is reclaiming and filling out the river front, known as the levee, to a line established by the War Department in 1893, known as the Harbor line. This line is from 175 feet to 600 feet out from the present shoreline. It was determined to try the burial method at this point where the retaining wall for the work was practically constructed, and to so utilize our disposal method to help in making the fill for reclaiming this territory. The city is divided into seven collection districts, each of which is served by one tight covered metal wagon, with a capacity of $1\frac{1}{2}$ cubic yards. All garbage is deposited by residents in metal cans with tight covers, placed on alley lines. These wagons collect all garbage except from hotels, restaurants, groceries and wholesale houses, at no cost to the tenants or property owners. The exceptions noted are forced to care for the hauling of their refuse matter themselves. One barrel wagon cares for the cleaning of vaults, night soil, etc., at a certain fixed charge per cubic foot removed.

During the months of July and August of this season, the seven city wagons delivered to the burial ground an average of 710 cubic yards of garbage per month; the wholesale houses, etc., delivered an average of 333 cubic yards per month, and the night soil wagon averaged 126 cubic yards per month; a total of 1,169 cubic yards of refuse delivered and covered. This covering was accomplished with one foreman and three laborers, at a monthly cost of 18.2c per cubic yard. This figure is based on our maximum conditions, so that during a large part of the year when the quantities are much less, the labor charge per cubic yard will run as high as 35¢ per cubic yard, with a fair yearly average, based on the past two seasons, of 28¢ per cubic yard.

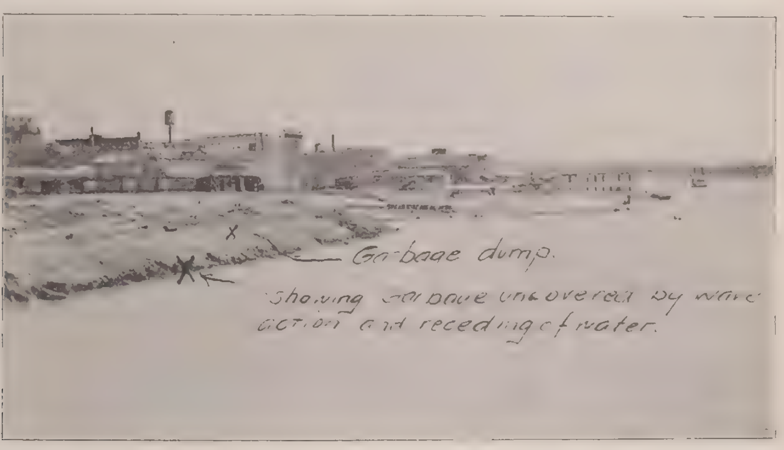

X
Garbage dump.
Showing garbage uncovered by wave action and receding of water.

Fig. 3.—Showing condition of garbage bank before mattress protection was placed. Nuisance was intolerable this day.

To cover this refuse, the city has concentrated the dumping of all available material at this point—cellar excavation, ashes from alleys, street sweepings, material from paving and sewer work in the vicinity, have all enabled us to provide ample covering material without additional cost to the city. At intervals, however, during the late fall and winter, we have been forced to purchase some sand—if much of this were to become necessary, our burial proposition would be too expensive, but so far the cost has been small.

The method so far pursued, has been to work over the face of the bank fill, which is about eight to twelve feet high. The wagons are backed to the edge and dumped automatically over the edge. As the slope of the bank is about 1½ to 2 to 1, the refuse requires very little raking to spread over the face in a thin layer. Piles of covering material are always dumped along the top of this bank so spaced that there is just room between piles to back in the garbage wagon. As soon as the wagon pulls out, two men with long-handled shovels spread the covering material from the two adjacent piles upon the freshly dumped refuse.

In ten minutes the garbage is covered to a depth of from six to ten inches. This has been found sufficient for immediate protection and during the day more is added as the opportunity offers, until from twelve to sixteen inches of covering is placed by night. One advantage of working over the face of the bank is that all surplus moisture drains out of the garbage into the water of the river so that less covering material is required and a firm, more stable fill is obtained.

Only at times of a high stage of the river has any serious trouble been encountered. At such times, the wave action and current have seriously cut into the fresh bank and caused an intolerable nuisance. In 1911 we were forced to place a mattress protection to prevent washing out and to move to the high level bank until the water receded. These mats were made of ordinary chicken wire fencing, six feet tide and fifteen feet long—two thicknesses of wire with about ten inches of old hay between, all tied and laced with marlin. These were hastily thrown together, hung over face of bank and weighted with riprap. The wash of the bank and silt of river sealed these mats at once and completely stopped the cutting away of fill and prevented any further nuisance.

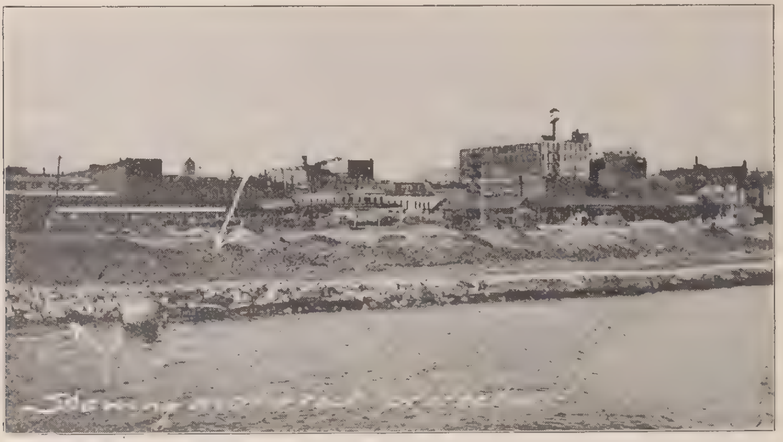


Fig. 4.—Same bank as Fig. 3 after protection. No odor.

Since the retaining wall on the Harbor line has been constructed to such a height that there is no danger of the river getting at our bank, we have had no trouble whatsoever with our disposal methods and complaints of odor or any nuisance are almost unheard of. As the disposal grounds are not over 600 feet from the business district, we think that we have attained a very fair degree of success with our method.

In addition to satisfactorily disposing of the refuse question for years to come, the use of the method during 1911 alone, caused to be deposited in our levee some 50,000 cubic yards of material, a large part of which would hitherto have been scattered all along the river and largely wasted. The land which this fill is reclaiming, is worth to the city, at a conservative estimate, $35,000 per acre. By the end of 1913, we will have an eight-acre tract reclaimed at the present dumping ground, largely by the burial of garbage—the only cost to the city being that of the retaining wall. We have found that it requires about two cubic yards of covering material to effectively cover $1\frac{1}{2}$ cubic yards of garbage or night soil.

The attached photographs will give an idea of the methods used and general conditions at the disposal ground.

GARBAGE PIGGERIES.

ALVAH W. BROWN,
Owner, Pig Farm, Grand Rapids, Mich.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C. September, 1912.

I have been requested to write my thoughts regarding the disposal of garbage, by feeding same to swine, by Mr. Greeley and he sent me a schedule of several printed forms to govern my delineations; but as I am merely a practical man at the disposal end, I must write according to my own ideas, otherwise I would become hopelessly entangled and perhaps utterly fail to give you my version.

For a term of five years I served our city in membership on the Board of Police and Fire Commission and that put me in contact with city departmental troubles, one of which was the great expense to which our city was enforced in the disposal of its garbage by incineration.

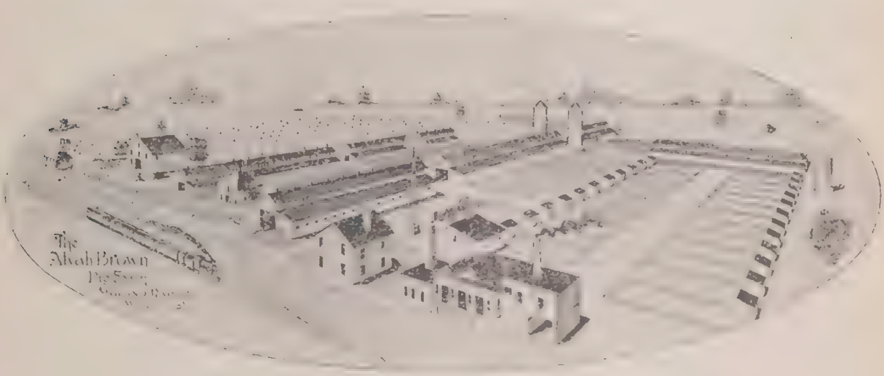
We have a city of about 120,000 population and the collection of its garbage, at the time my interest dates, was being made under the supervision of a contractor who had authority as sole collector with the privilege of charging families from 40¢ per month upwards for the collection of garbage; this method did not appeal to the citizens from a sanitation standpoint, because a family engaging the services of the collector might have a neighbor on either side who was disposing of his garbage in an unsanitary manner in an effort to avoid the expense entailed through the city's plan. The general demand was for municipal collection so the burden might be spread over the taxpayers in general, thus encourage each and every family to employ the collection service that might be installed under such a system. The city advertised for bids for the disposal of its garbage with the proposal that the municipality engage in the collection to cover the entire city, the expense to be borne by a fund derived through general taxation.

The facilities of the city being inadequate for destroying its entire collection by fire, the authorities were anxious to find means more economical if possible, to the desired end.

I began an investigation of the methods that were employed by various cities throughout the country, my research being wholly of a nature to determine the most profitable system for a contractor and our city to adopt.

My travel in investigating various methods has covered cities ranging all the way between Los Angeles, Cal., and New Boston, N. H., both terminal points at the time of my visit being the location of pig farms. I concluded that in order to produce a revenue for a contractor in disposing of garbage by reduction process, it would necessitate the payment of a contract sum by the city. It was my judgment that the burning of garbage was less desirable from the contractor's and city's standpoint because of the enormous expense entailed and the slight value of receipts resulting through such operation. My conclusions were, that the disposal of garbage on a pig farm was the only system that might be acceptable to my city, after reviewing the profits that might accumulate to the contractor through such a method.

I concluded to visit every pig farm of consequence disposing of municipal garbage and my research was quite complete. I found the plant in New Boston the most sanitary of any visited but the volume of business done at that plant was limited and the plans effective did not meet with my approval, as the expense in its conduct was too great. The pig farms at Worcester, Mass., and St. Louis, Mo., I found to be the largest and the most practical from a contractor's standpoint, but the last named plant was entirely too unsanitary to furnish any guiding line; from the Worcester plant I got the best ideas for a large industry, but concluded to establish more along the lines of the New Boston plant for sanitary arrangements.



After arriving at these conclusions I made the purchase of a sandy farm of one hundred acres on a railroad about five miles from the center of our city and proceeded to the establishment of a plant along the lines that were not presented at any industry I had visited and the illustration accompanying will give a better description of what I have developed than I can present through explanatory paragraphs. I am sending fifty illustrations of my plant, so they may be distributed among your members and more will be furnished upon application.

My contract with the city provides that the municipality shall collect the garbage from all families requesting collection service not less than twice each week, and the material is to be deposited in my cars, four of which I furnish of a water-tight, gondola variety, without recompense to the city. For the disposal service I receive nothing; the material I am to accept of is defined as meat, fish, fruit and vegetable refuse, liquid or otherwise, and all tin food cans. The contract specifically states that no dish water, sweepings, glass, lawn rakings, manure, ashes, papers nor other refuse shall be intermixed with the material collected.

The city was to prevent the collection of garbage by individuals who aimed to dispose of same in their own way and represented in the advertisements for bids, that it would be the sole collector and the contractor would receive all the garbage from families, hotels, restaurants and commission houses.

About seventy tons are being collected through the months of July, August, September and October; in May, June and November about fifty tons are collected daily; through the other months the collection will average between thirty-five and forty tons per day.

I am obliged to pay the freight from the loading station of the city to my farm, one car of which is sent every weekday, and during the period of four months covered by the seventy-ton daily collection two cars per day are shipped occasionally, in order that the accumulation is taken care of.

These cars, as the illustration indicates, are switched on to my farm siding and are hauled through my buildings by cable power which is of the windlass or capson variety, a horse being employed as the motive. The car travels slowly and six men are placed in same for pitching the garbage on both sides of the track on the concrete platforms from which the swine are excluded during the feeding process. As the car passes each compartment, the swine are admitted to the feed until the entire length of about one thousand feet of trackage has been traversed; feed for the buildings containing swine, not adjacent to the side track, is delivered by wagons; the garbage deposited in the detached buildings is not of a great volume beause they contain sows with their litters which do not require a great amount of garbage as they are fed buttermilk and meal in addition to the other. All buildings are built on a plan so that team and wagon may be driven lengthwise through the center for feeding and cleaning conveniences. All buildings have smooth concrete floors for sanitary reasons and such a floor also furnishes ease for cleaning on account of there being no interruption in the scoop of the shovel as nail heads and unevenness in board floors provide. Each of the three farrowing buildings numbered 3, 4 and 5 in the illustration, are twenty rods long, thirty feet wide and contain one hundred and twelve compartments and litters. Each compartment is six by twelve with a yard six by sixteen adjoining each compartment. So little garbage is fed in these that it was not thought advisable to arrange them on the railway siding as the building expense would be greater on account of the twelve-foot width of center aisle necessary for a railway car, whereas a team and wagon pass through a six-foot aisle.

Buildings marked 1 and 2 through which the railway cars pass are partitioned into stalls varying from twelve to thrity-six feet in frontage on the aisle or track; these are of various sizes because of the necessity of having stock of different ages in proper numbers to insure thriftiness. It is especially necessary that young, newly-weaned pigs be kept in small numbers which I could satisfactorily explain to any interested party. When the pigs get to a size of one hundred pounds or more, a greater number may safely be kept together; as an example, I frequently have from four to five hundred brood sows in the same lot and sleeping quarters in the winter, whereas one quarter of that number of weaned pigs running together would mean positive loss by death in great numbers.

The buildings through which the railway cars run have a concrete feeding platform on each side of the track nine feet in width; beyond these are the sleeping and roaming quarters. The concrete feeding platforms have gate partitions between each bunch of swine that may open, thus allowing teams to drive the entire length of said buildings on either side of the track for cleaning purposes very morning after the hogs have had all the opportunity to be allowed for eating from the previous day's deposit. The food that is placed on the platform in the forenoon of today is gone over by the swine confined thereon until five o'clock. Then they are closed into the sleeping and roaming quarters and the gates dividing the feeding platforms are all thrown open, this allows from six hundred to one thousand brood sows and store hogs to have access to the feed that has been previously gone over by the hogs confined. Tomorrow morning the brood sows will be driven from the feeding platforms and the wagons follow in for cleaning purposes. The brood sows acting as night scavengers on the platforms are those whose pigs have been weaned, a large number of which we constantly have on hand. This system gives the first chance at the food to the pigs and fattening stock confined in the building and the brood sows act as a supplementary clean-up brigade who work all night if their appetites so incline them.

As the wagons pass down the concrete feeding platforms on either side of the track every morning the first wagons through carry away tin cans, glass and other rubbish that is not suitable for depositing in the compost heap; following these is a wagon which carries away the bones; then come the wagons into which the sleeping quarters as well as the feeding platforms are cleaned and these loads are hauled to the compost heaps and the material is confined in a way to prevent the least possible escape of odors from the action of decomposition which ensues and makes the material very desirable for land fertilization as the crops on my farm and others in the vicinity indicate. This is hauled out on the land in the winter time when teams are most apt to be idle, but more or less is taken away through the summer months. The detached buildings are also cleaned in the same manner.

My farm is almost entirely devoted to the raising of corn which is harvested when the kernel is just passing into the dough state. This is run through an ensilage cutter and cut into lengths about three quarters of an inch long and elevated into silos numbered 15 and 16. As we do not get a carload of garbage on Sunday, one of our cars is placed between the silos and sufficient quantity of ensilage is taken out to feed that day all along the track and the other buildings are fed with the same material including buttermilk and meal by wagons. In feeding ensilage but one day each week, the swine have quite a relish, not only for the grain, but for the finer part of the stalks and leaves, but there is more waste in feeding ensilage to hogs than to cattle. My silos are each sixteen by forty-two feet inside and are wholly of concrete including the roofs and each holds about two hundred tons.

Number 17 in the illustration represents our concrete water tank which holds two thousand barrels and is on the highest elevation of land on the farm which is forty-nine feet above the creek nearby from which water is elevated by a hydraulic ram located below a concrete dam in the creek. We found this did not furnish ample supply and a steam boiler and pumping equipment is located near by to fill the tank as occasion requires. This tank furnishes a good pressure of water which is piped under ground to the buildings, yards, stable and lawn and a good wholesome quality is provided; in many of the yards are located automatic drinking fountains that need but little attention.

Building marked 17 encloses six large concrete boiling tanks each four feet deep, six feet wide and twenty-four feet long; in these tanks is a system of steam pipes that cooks the garbage after water has been added and grease is taken from the top after the process has been completed; the garbage is then allowed to flow into other tanks for cooling and storage. The cooking process is not followed in the summer as the vegetable substance in the garbage so largely predominates in volume that it absorbs so large a percentage of grease from other substances that cooking is thought inadvisable. Aside from this, vegetable matter such as melon and fruit offal is made less valuable as food for swine in being cooked, but in the winter time the volume of garbage is decreased and the per cent. of grease to the ton is greater and it also puts the frozen portion in more palatable condition and enables us to feed warm slop to young stock. Our cooking tanks are elevated and so arranged that the cooked garbage flows from one tank to the other and eventually in the wagon tanks and tramway cars for distribution among the swine.

Building 6 is our blacksmith shop where our repairs are made and the shoeing of horses attended to. To handle the work at our plant, fourteen horses and twenty men are employed nine hours per day; we use bottom dump wagons entirely for our cleaning and these are drawn up an elevation by cable power over the compose heap which is surrounded by concrete walls and there deposited, thus avoiding all the manual labor possible.

This farm has been established less than six years, and previous to that time industries of this character have been of a very hazardous nature because of the great risk of loss of stock through the ravages of hog cholera. Since the government process of hyper-immunization has been perfected, this disease can be controlled with slight losses if the rules are systematically followed. Cleanliness is essential from a sanitary standpoint, but the lack of it has apparently no effect upon the prevalence of cholera in event the stock has once been made immune. The pigs are treated at the age of from four to ten weeks and while nursing; a pig is held in position by one man and by hypodermic, virus is injected in the inside of the left ham which furnishes the disease germ; serum is injected into the right which furnishes the combative qualities in the pig's system; this is known as "the simultaneous treatment" and is not always practical because of the danger in handling the virus on the part of the operator. My losses in pigs from this treatment in the summer months will not average above five per cent., but in the other months which are not so favorable to the pigs, the losses are considerably greater and the per cent. depends on the weather conditions. I treat pigs at this age because of the lesser amount of material required as this is regulated by the avoirdupois of the animal. Another reason is that all our stock must be immune, otherwise the animals are quite sure to contract the disease early in life. If any animals are to die through vaccination or through the disease we want it to happen while they are young and before any investment of consequence in their development has been occasioned. My experience indicates that treatment by this process makes the animal immune during its natural life which does not often exceed four or five years and is generally much less. My pigs being from immune sire and dam makes them less susceptible to the disease if not vaccinated and less liable to death through the vaccinating process. It has been estimated that pigs from stock where immunity extends back several years on both sides have about 40 per cent. of immunity even though no treatment is given and I believe this is a fair estimate.

A large part of my sales are of pigs and mature breeding stock that go to garbage disposal plants and the farmers, where cholera has prevailed to an alarming extent. I have furnished foundation stock to a number of garbage disposal industries, not only because of being able to provide cholera-immune animals, but because it is necessary that such plants be stocked with swine that have been accustomed to the character of food to be provided. If a garbage plant is stocked with farmers corn- and grass-fed hogs there will be a greater loss by death then if they are wholly raised on garbage feed. I know this to be true from the statements of others and I have had expensive experience along the same lines and before I could establish a successful herd I found it necessary to buy this very class of animals.

Another trouble which is generally met in enterprises of this character is through the fact of the establishment of unsuitable feeding and sleeping quarters for the stock and the lack of the right kind of soil. Our buildings are well constructed and permanent which makes the business not only more profitable, but greater satisfaction through the conduct of the business is derived. At this writing I have 5,860 swine at my plant and they are confined to about twenty acres of land; my herd sometimes runs above six thousand, but in winter I shall aim to reduce the number to about four thousand.

The city owns the wagons and horses used for the collection and the men are hired by, and under control of the Board of Health. At this time fourteen two-horse wagons and three one-horse wagons with covered steel tanks are collecting from 19,012 families twice each week and from sixteen hotels and thirty-nine restaurants daily, with two men working eight hours on each wagon.

We do no slaughtering at the farm, but have facilities for loading stock, bones, grease and fertilizer in carload lots. Fat hogs are finished on corn and mill feed.

From the city's standpoint of economy and the contractor's ambition for revenue, I am satisfied there is no system of garbage disposal that will meet the requirements so completely as that which is effective in Grand Rapids, and for endorsement of this statement I respectively refer you to the city authorities here.

I would welcome a visit to my plant by any interested parties.

DISPOSAL OF GARBAGE BY THE REDUCTION METHOD.

Irwin S. Osborn,
Engineer in Charge Refuse Disposal, Columbus, Ohio.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

The disposal of garbage by the reduction method was first introduced in the United States at Buffalo, N. Y., in 1886. The plant installed at Buffalo was known as the Merz process and the disposal was made by placing the garbage in dryers so as to break down the material and drive off the moisture, after which the solids were placed in extractor tanks and the grease recovered by means of a solvent, such as benzine and naphtha.

Since the installation of the first plant at Buffalo, reduction plants have been constructed in the majority of the larger cities of the United States.

The plants operated at the present time by what is known as the Merz process differ from the first installations in regard to the manner in which they are operated. In the first installations of the Merz process, the garbage was placed in steam jacketed dryers which were expensive to operate and necessarily slow in drying on account of the low temperature. In the present plants of the Merz type the garbage is first crushed or disintegrated and then passed through continuous direct heat dryers, so that the garbage comes in direct contact with the combustion gases and is dried while passing through the dryer.

A few years after the installation of the first plants of the Merz type, plants were installed at Cincinnati, Ohio, and Providence, R. I., which used what is known as the "Simonin Process."

In the plants of the Simonin type the garbage was reduced by placing it on to small cars built up with shallow trays which, when loaded, were run into extractor ovens, consisting of large iron shells six feet wide by eighteen feet long, where it was treated with hot naphtha and naphtha vapors under pressure for a period of twenty-four hours. The grease united with the naphtha and dropped to the bottom of the extractor shell and was drawn off and separated by distillation. After the recovery of the grease, live steam was turned into the shell to remove naphtha before removing the material. The plants using this method were operated for a few years, but were finally abandoned or replaced with other methods due to the losses of solvent and excessive cost of operating. Considerable complaint was made over the odors given off at the time the extractor shells were opened.

The first plant in which the garbage was sterilized with steam, or cooked in closed tanks, was installed at the foot of Capitol Street, Washington,

D. C., in 1892. The plant was operated but a short time when it burned down and was never rebuilt.

Following the installation of the plant at Washington, plants were constructed at Philadelphia, Boston and New York, using what is known as the Arnold-Edgerton system.

A large number of patents have been issued for garbage reduction machinery and equipment and several processes installed under various names such as Merz, Simonin, Chamberlain, Holthaus, Edson, Arnold-Edgerton, Flinn, Wheelwright, Weislogle, etc. The plants installed under the various names differed in detail as to the manner in which they were operated to correspond to the ideas of the designer or to meet the local conditions.

The reduction of garbage consists in the breaking down of the material by means of heat and the recovery of the by-products, which have a market value. The work can be accomplished by cooking in open kettles and skimming the grease off by hand, by drying and extracting the grease by means of a solvent, or as is done in the more modern plants where the cooking method is used and the work done in closed apparatus which is mechanically operated.

At the present time garbage is usually reduced by one of two methods and for distinction all the plants operating can be considered as using either the drying or cooking method.

The two methods might be described as follows:

1. *Drying method.* The drying method consists in crushing or grinding the crude garbage and passing it through direct heat dryers to drive off the moisture and break down the cells. The dry solids are then placed in extractor tanks and the grease recovered by percolation using gasoline as a solvent.

2. *Cooking method.* The cooking method consists in placing the garbage in digestor tanks where it is cooked and then exacting the free grease and moisture by pressing. The solids from the presses are then dried and in the more modern plants the dried tankage is percolated to recover the grease that is not extracted by the presses.

The relative advantages of the two methods give rise to a difference of opinion, although at the present time the majority of plants are operated by the cooking method. The advantages and disadvantages of the two methods might be summed up as follows:—

Advantages of Drying Method:

1. The first cost of the plant is less, due to the equipment and building space required.
2. The operating costs are less, due to the amount of labor and power required.

Disadvantages of Drying Method:

1. Carbonizing of the grease in the dryer, due to the high temperature required so that the maximum amount of grease is not recovered.

2. The material is not broken down so that solvent will act as readily on the grease particles to allow maximum recovery.
3. The mechanical condition of by-products is not as desirable without additional treatment.
4. There is a greater volume of gases to be deodorized, making it difficult to deodorize the same economically.

Advantages of Cooking Method:

1. The cells of the material are more completely broken down so that a larger amount of grease can be more readily recovered.
2. All material is enclosed during the process, so that the gases are more readily deodorized with a less volume to be deodorized.
3. In the modern plants the mechanical condition of the by-products is better.

Disadvantages of Cooking Method:

1. Increased first cost of building and equipment.
2. Increased operating cost.
3. Increased maintenance costs.

The by-products produced by either method have the same relative market value. In plants that have been operated by both methods the experience has been that the additional amount of grease recovered by the cooking method has more than offset the increased costs and at the same time the odors were eliminated to a larger extent.

The criticism of reduction works has been due to the manner in which works have been constructed and operated and the same criticism will continue as long as the work is done by contract without restriction as to the manner in which it is to be done. It is only natural for a contractor, who obtains a contract in competition without restrictions, to conduct the work at the least cost with the largest renumeration possible. The result will be inferior equipment and little attention paid to the sanitary features, either in the design or operation of the disposal works.

The greatest cause for complaint arises from the odors produced in carrying on the work where the necessary equipment is not provided for deodorizing the gases. The odors will usually arise from one or two sources; the gases given off from the vents on the digestor tanks or the vapors or gases given off by the dryers.

The manner in which the gases can be deodorized consists in condensing the soluble gases and passing the insoluble gases through furnaces where they are heated to sufficient temperature to deodorize them. From experiments and tests the writer has made, using special high combustion furnace fitted up so that the gases were passed through the furnace at various temperatures, it was found that the insoluble gases from the cooking tanks were deodorized when heated to a temperature of 1200 degrees Fahrenheit, and very little odor could be found after heating them to 1000 degrees Fahrenheit.

The deodorizing of gases from the digestors or cooking tanks is not difficult, due to the small volume, as the material while being cooked is sealed in the tank and the gases escaping are passed through closed vent lines to condensers which in turn discharge into a sealed hot well where the insoluble gases are trapped. The insoluble gases from the hot well are conducted to furnaces and deodorized with the combustion gases. The gases from the dryers can be deodorized in a similar manner, but it proves a more difficult problem where direct heat dryers are used, or hot air is used as a drying agent, due to the dryers giving off a large volume of air, which does not condense and must be heated to the desired temperature. When garbage is first cooked and pressed so that only a small per cent. of the moisture is required to be evaporated in the dryer, the boiler furnaces will usually be of sufficient capacity to deodorize the gases. When the dryer method is used and the green garbage, containing from 75 per cent. to 80 per cent. of moisture is first treated in the dryer, the volume of gases is so large that it will require additional furnaces to heat the great volume of gases to the desired temperature. In plants operating with the dryer method it has never been attempted, due to the excessive cost that would be necessary to maintain and operate the furnaces.

In utilizing garbage by the reduction method the fact must always be borne in mind that a low grade of material is to be utilized, which will not warrant recoveries beyond a point where the costs will be at a minimum after first considering the sanitary features. The developments in regard to the recoveries that can be made have advanced, until all the solids in the form of grease and tankage can be recovered at an economical cost. Other by-products besides grease and tankage can be produced from garbage but the work has not developed so that the additional cost will warrant making the recoveries. The grease at the present time is usually refined by the purchaser into several by-products such as glycerine, stearin, stearic acid, red oil, candle tar and soap fats, and no doubt some of the larger reduction plants would find it profitable to refine the grease so as to obtain the additional profit now derived by the refining companies.

One of the largest factors in developing the work in connection with the disposal of garbage by the reduction method has been the increased demand for the by-products. From the first plant installed at Buffalo and the by-products produced in the same, the number of plants has increased until at the present time there are twenty-five reduction plants in the United-States from which there is produced annually approximately 60,000,000 pounds of grease and 150,000 tons of tankage, having an average market value of $3,500,000.

The disposal of garbage by reduction has been carried on in past years by private companies and previous to 1905 was not attempted by municipalities. In 1905 the city of Cleveland, Ohio, purchased a plant from a contracting company and has operated it since that date as a municipal enterprise with very satisfactory results from an economical standpoint.

The sanitary features had received little attention in the original design and the plant was so constructed that they could not be installed properly, although in rebuilding a part of the plant great improvement has been made.

The second and only other city operating a municipal reduction plant is Columbus, Ohio. The plant at Columbus was placed in operation in July, 1910, since which time very satisfactory results have been obtained. The plant has shown a profit since starting over and above the operating costs and the fixed charges, including interest and depreciation.

During the year 1911 the plant reduced 17,534 tons of garbage, an average of 56.56 tons per day, which is approximately one third the rated capacity. The operating cost for the year amounted to $1.84 per ton and the fixed charges, based on 4 per cent. interest and 5 per cent. depreciation, amounted to 97¢ per ton, making a total cost for disposal of $2.81 per ton. The receipts form sale of by-products amounted to $3.35 per ton, so that the plant showed an earning of 54¢ per ton over and above all charges.

Since the first of the present year a percolating plant has been in operattion to extract the grease from the tankage, which during 1911 was not recovered. During 1911 there was produced 2344 tons of tankage, which on analysis was found to contain on an average of 10.2 per cent. of grease. Based on the present recovery of grease by percolatoin 8 per cent. of grease would have been recovered, amounting to 188 tons and valued at $18,800.00.

The recovery of grease by percolation would have increased the receipts of the plant $1.08 per ton of garbage treated, and the cost per ton for treatment, including operating cost and fixed charges based on the present cost of percolating, amounts to 30¢, or the net earnings would have been increased 78¢ per ton of garbage by percolation, which would have made the net earnings $1.32 per ton, over and above operating costs and fixed charges.

In estimating the cost for the disposal of garbage by reduction, the figures given on the operation at Columbus for the year 1911 can not be taken without knowing the conditions to be met. If the Columbus plant had been operated at the rated capacity with allowance for seasonal variation an average of 125 tons per day could have been reduced. Had the plant been operated with an average of 125 tons per day, the operating costs would have been decreased from $1.84 to $1.40 per ton and the fixed charges would have amounted to 44¢ per ton instead of 97¢ with the earnings from the precolating plant per ton remaining approximately as given above, so that the total earnings over and above all charges would have amounted to $2.29 per ton. The figures given are based on the prices received for by-products during the year 1911, which amounted to $10 per ton for tankage and 5.03¢ per pound for grease, so that in estimating receipts from sale of by-products allowance must necessarily be made for fluctuating market value of the products.

Economical results may be obtained by the utilization of heat in the disposal of garbage, mixed with other refuse, by burning, but to prove satisfactory the maximum sanitary results must be obtained at a minimum cost and where the quality is such that it will warrant utilization, the reduction method will continue to show more economical results and with proper attention given to details and sanitary features the work can be conducted without nuisance.

INCINERATION OF REFUSE.

J. T. Fetherston,

Superintendent, Bureau of Street Cleaning Borough of Richmond, New York City.

Read before the Sanitary Engineering Section, American Public Health Association, Washington, D. C., September, 1912.

Two significant aspects of incineration as practised to-day in the United States will be considered, viz.: Garbage Cremation and Mixed Refuse Destruction.

I. Garbage Cremation.

During the past twenty-seven years, about two hundred garbage crematories have been installed by different cities and towns in this country, yet it was not until 1909 that comprehensive, scientific tests of this general type of incinerator by an unbiased authority became available.

Table No. 1 summarizes some features of the extensive observations made by the Engineers of the Ohio State Board of Health on four types of garbage crematories:—

TABLE NO. 1.

Tests of Garbage Crematories in Ohio, 1909.

City.	Material Burned.			Lbs. Equivalent Coal Used Per Ton Material Burned.	Avge. Temp. Combust. Chamber ° F.	Average Co 2 %.
	Garbage %.	Mixed Garbage %.	Night Soil %.			
Canton	100.	—	—	730.	755.	3.1
Mansfield	100.	—	—	362.	1002.	8.3
Marion	31.7	11.7	56.6	370.*	803.	1.2
Steubenville	86.	14.	→	642.	716.	1.6
Zanesville	81.	19.	—	631.	682.	3.7

*Coal equivalent of gas used.

The temperature in the combustion chambers of the five plants tested averaged 792° F., and as temperatures below 1250° F. indicate incomplete combustion, the authoritative conclusion from the observations that "the plants as operated fail usually to dispose of the garbage at a temperature high enough to avoid the production of odors" is significant and conclusive.

II. Mixed Refuse Destruction.

In 1906, the first mixed refuse destructor of the type evolved in Great Britain was installed in North America at Westmount, Canada, and today, four plants burning mixed wastes are operating in the United States.

Some data concerning the five destructors mentioned are summarized in Table No. 2:—

TABLE NO. 2.

Tests of Refuse Destructors.

City.	Test Period.	Material Burned %.				Av. Temp. Combust. Chamber. °F	Av. Co 2 %.	Evap. per lb. Refuse from and at 212° F.	Rated HP. of Boilers.	Clinker %.
		Ashes.	Garbage.	Rubbish.	Manure.					
Westmount, Canada	May 3, '06	70	15	15	—	1994	10.9	1.36	220	42.1
Seattle, Wash.....	July 31, '08 Aug 1, '10 Two years	43.5	32.1	20.4	4.0	2376	10.2	1.00	220	43.2
West New Brighton, N. Y.	July 1, '08 July 1, '11 Three years.	68	24.9	7.1	—	(a) 1750	(b) 8.8	(c) 1.23	183	40.0
Milwaukee, Wis...	May 19, '10 June 3, '10	43.8	42.4	5.8	80.0	1646	10.3	1.25	800	—
Montgomery, Ala	July 26, '11(f)	25	42	13	20	1920	11.0	1.37	180	—

(a) Fery recording pyrometer-continuous record.
(b) Simmance-Abady Co2 recorder.
(c) Meter record.
(f) Mainly street sweepings and green grass.

Compared with the tests of garbage crematories (Table No. 1), the average destructor temperatures in connection with the gas analyses indicate freedom from odors due to unconsumed gases — a primary requisite for satisfactory incineration of the wastes. Thus the mixed refuse type of plant corrects the inherent defect of the garbage crematory.

Three features in connection with mixed refuse destructors may be noted —no added fuel is required, steam power is produced and quite a residue (clinker) results.

At Westmount, Canada, power from the destructors (the 1906 plant has since been duplicated) is used in the adjoining municipal electric lighting plant, but the four destructors in the United States have as yet no advantageous outlet for the steam power produced, as private ownership of public utilities is in control. Milwaukee, for instance, was prevented from operating an electric power station in connection with the refuse destructor because it would interfere with the rights of a private corporation, and in New York City, the charter prevents public competition with private ownership.

General Comment.

Incineration of refuse is not a cure-all and before its adoption by a municipality, alone or in combination with other systems of disposal, requires the same thorough preliminary study and expert analysis that any other engineering project should receive.

American Journal of Public Health

Official Organ of the American Public Health Association
Published Monthly by the American Public Health Association.

VOLUME II.—Old Series Vol. VIII. DECEMBER, 1912. Number 12

$2.00 a year. 20 cents a copy.
LIVINGSTON FARRAND, M. D., Editor. SELSKAR M. GUNN, B. S., Managing Editor
PHILIP P. JACOBS, Ph.D., Business Manager.

All expressions of opinions and all statements of supposed facts are published on the authority of the writer over whose signature they appear and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

REFUSE DISPOSAL.

On no occasion before the last Annual Meeting of the American Public Health Association has there been a public discussion, either in Europe or America, on the subject of Refuse Disposal so comprehensive in character and by as many authors, who have thoroughly studied it or have had a large practical experience with its various phases.

The subject is considered, as it should be, from the house pail to the final resting place of the material. It is considered from a broad standpoint, including all the various conditions prevailing in this country; such as cold and warm climates, character of fuel refuse, varying with the prevailing use of coal, oil or gas, which affects favorably or unfavorably the calorific value of a city's refuse, kitchen garbage, varying from a high food value for pigs to a dangerous use for this purpose, and from a high grease value to no practical value, and various other conditions which may or may not impose upon a community the disposal of manure, street sweepings, general rubbish, etc., in a sanitary and an economical manner.

From most of the papers the two general conclusions will be gained, first, that at the present time it is practicable to collect and dispose of the solid refuse of a city in a sanitary and economical manner, by well tested methods and without serious difficulties, secondly, and that the service is one which requires for guidance, the joint efforts, skill and experiences both of the medical profession and sanitary engineering, and for operation, well trained and faithful superintendents and men.

THE AWARD OF THE BUCHANAN MEDAL.

Members of the American Public Health Association must feel a special satisfaction in the award of the Buchanan Medal of the Royal Society of England to our fellow-member, Col. W. C. Gorgas. The conquest of yellow fever has been perhaps the most striking and dramatic of all the triumphs of sanitary science, since Pasteur displayed his anthrax-infected and his vaccine protected sheep at the farm of Pouilly le Fort. With the conquest of yellow fever, Doctor Gorgas has been intimately connected, almost from the first. After the epochmaking demonstration that yellow fever was transmitted, and only transmitted by the bite of the Stegomyia mosquito, accomplished by Reed, Carroll and Agramonte in 1901, it was Gorgas who took up the practical task of mosquito extermination and accomplished it so successfully that he was made Colonel by special act of Congress in 1903 in recognition of his distinguished services. In the next year he became chief sanitary officer of the Panama Canal Zone and in 1907 a member of the Isthmian Canal Commission. It has been rightly said by discriminating visitors to Panana that it is not primarily as an administrative triumph,—for there are plenty of big businesses in the United States that require as high an administrative faculty; it is not primarily as an engineering triumph,—for the New York Water Supply involves engineering problems of greater difficulty; it is as a triumph of sanitation that the Panama Canal stands unique. If our memory is not at fault it was Charles Francis Adams who described the Canal as the eighth wonder of the world, for precisely this reason, that one of the worst plague spots of the globe had been made fit and healthful for the life and work of man, an achievement unprecedented in the history of the human race and momentous for the whole future of the tropics. The discovery and the application of the principles that have made this possible is peculiarly the work of the American peoples. The first suggestion of the mosquito theory we owe to Finlay of Cuba. United States army officers working on Cuban soil carried the theory through to a perfect demonstration and in Cuba by Gorgas and Guiteras, in Mexico by Liceaga and his associates, as well as on the Isthmus, it has borne its richest fruit. The countries represented in the American Public Health Association all share in this honor which has come to Colonel Gorgas, and, through him, to American sanitary science; and American sanitary science could have no worthier representative to be the recipient of such an honor.

FIELD EQUIPMENT FOR LABORATORY WORK ON WATER SUPPLIES.

H. A. Whittaker,

Assistant Director, Laboratory Division, Minnesota State Board of Health.

Since August, 1910, a portable, emergency plant for the hypochlorite disinfection of water supplies has been maintained by this Board to permit the immediate disinfection of water supplies during a water-borne epidemic. This plant has already been described.[1] The maintenance of such a plant in constant readiness for field service has rendered possible the immediate disinfection of several infected water supplies during an actual epidemic. This exceedingly rapid method has brought with it a demand for laboratory apparatus which can be taken into the field for determining whether or not the treatment is successful. For this purpose there is required chemical apparatus for following and testing the chemical phases of the hypochlorite treatment and a portable incubator, by means of which presumptive colon tests and bacterial counts can be made at once without losing the time necessary to ship the specimens from the field to the main laboratory for incubation.

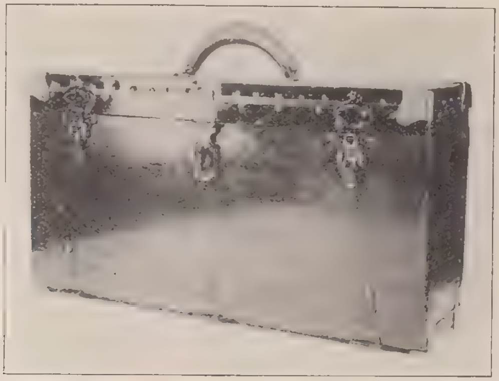


Fig. 1.—Case for chemical outfit.

To meet these demands, satisfactory outfits have been designed which lend very material aid and add greatly to the convenience of the investigator in applying the treatment. They have been used with great sucess in several instances. For the purpose of easy transportation each outfit is packed in a separate case which is divided into compartments adapted for its particular contents. The cases are made of ½-inch basswood, stained with a simple wood stain, the edges bound with sheet iron and brass. The top of each case is supplied with a convenient leather handle for carrying and opens on strap hinges at the back. The corners are bound with iron for protection in shipment. In addition, the front of the chemical case at the bottom is provided with strap hinges in order that the front may open down and provide a working table. The lid carries a hinged, iron

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[1] *Engineering News*, 1911, Vol. 65, No. 14, p. 402.

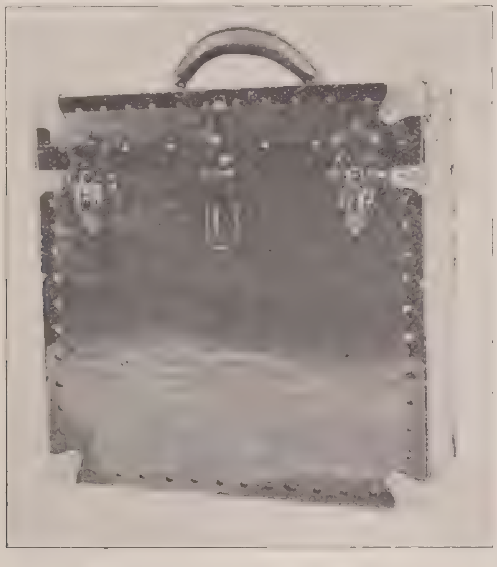

Fig. 2.—Case for field incubator.

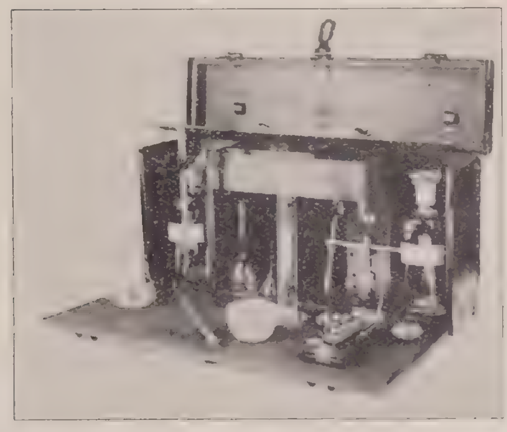

Fig. 3.—Chemical case ready for use showing compartments and contained apparatus.

strap which engages with a staple on the front of the case and is secured with a padlock. The cases are shown ready for shipment in Figures 1 and 2.

PORTABLE CHEMICAL OUTFIT.

The chemical case ready for use is shown in Figure 3. The case is divided into the several compartments adapted for holding the particular apparatus. The lid is converted into a compartment by a hinged cover which is held in place by two small, brass hooks and which at the same time serves to cover the lower compartments when the case is shut. This lid compartment carries two 10 c.c. graduated pipettes and one 25 c.c. burette, each held in place by means of spring, brass clamps. The lower portion of the case is divided into six compartments. Each of the end compartments carries a 1000 c.c. glass stoppered bottle; in one is placed $\frac{n}{10}$ iodine solution and in the other $\frac{n}{10}$ arsenious acid solution. The end compartment at the left above carries a brass block into which may be screwed a threaded burette clamp. This is not shown in the drawing. The lower central compartments carry one 100 c.c. graduated flask, one 250 and one 400 c.c. Ehrlenmeyer flask and one glass funnel 1½ inches in diameter.

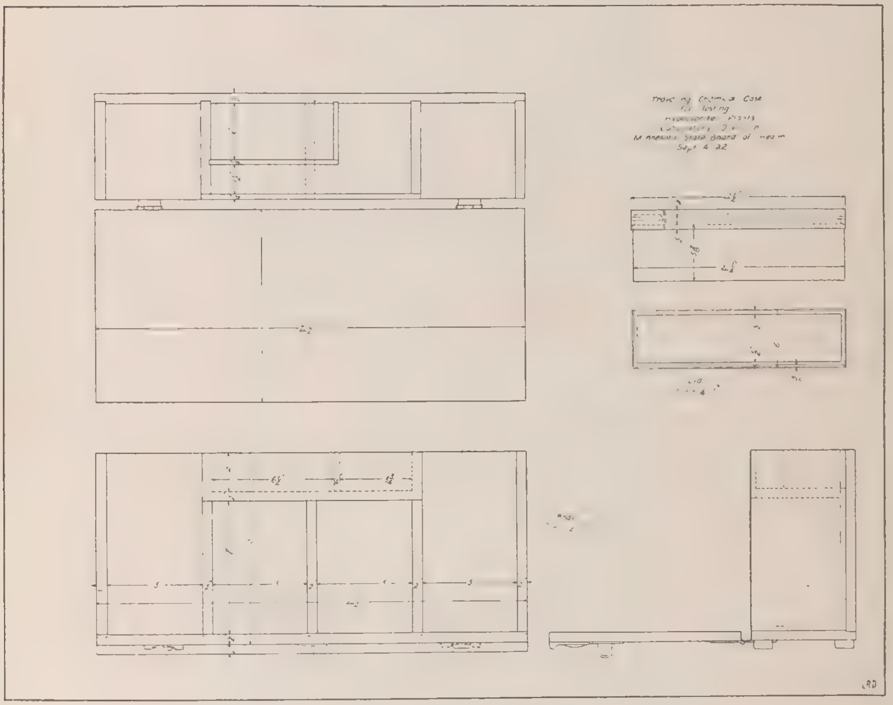

Fig. 4.—Chemical case drawings showing dimensions.

The upper compartment is divided into two, one will just hold a case in which there is a collapsible, pocket scale. In the other sub-division there is placed one porcelain mortar and pestle $2\frac{1}{2}$ inches in diameter, and one 100 c.c. graduate. It may be necessary to grind slightly one edge of the foot of this graduate.

In preparing for shipment the two end compartments are lined with corrugated paper. The glassware in the two center compartments is packed in paper or cotton. No packing material is required in the other compartments. Sectional drawings are shown in Fig. 4.

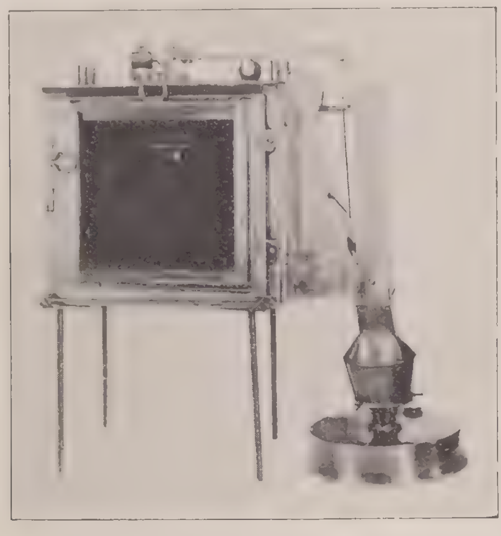

Fig. 5.—Field incubator ready for use.

PORTABLE FIELD INCUBATOR.

The field incubator set up ready for use is shown in Fig. 5. It is made by adding certain features to any water-jacketed, copper-lined incubator or paraffin oven. The attachments consist of a device for applying heat from the kerosene lamp and a regulating apparatus. The heating apparatus consists of a heating shaft and a radiator shaft which are attached to one end of the incubator by thumb screws. The radiator shaft which is applied directly to the side of the incubator is closed at the bottom and covered at the top with a hood. It contains a small water radiator made of a thin rectangular, copper compartment intersected with $\frac{1}{2}$-inch copper tubes for increasing the surface exposed to the heat. This radiator is attached to the incubator at an angle of about 45° by means of two $\frac{3}{8}$-inch brass pipes, one at the top and the other at the bottom of the radiator.

The heating shaft, attached to the lower end of the radiator shaft, is rectangular in shape made of copper—open at the top and bottom and fits over the kerosene lamp used in generating the heat. Between the heat shaft and the radiator shaft is a small door hinged on a rod by means of which the heat can be turned on the radiator or shut off from the radiator as necessary. The thermo regulator is of the ether type and consists

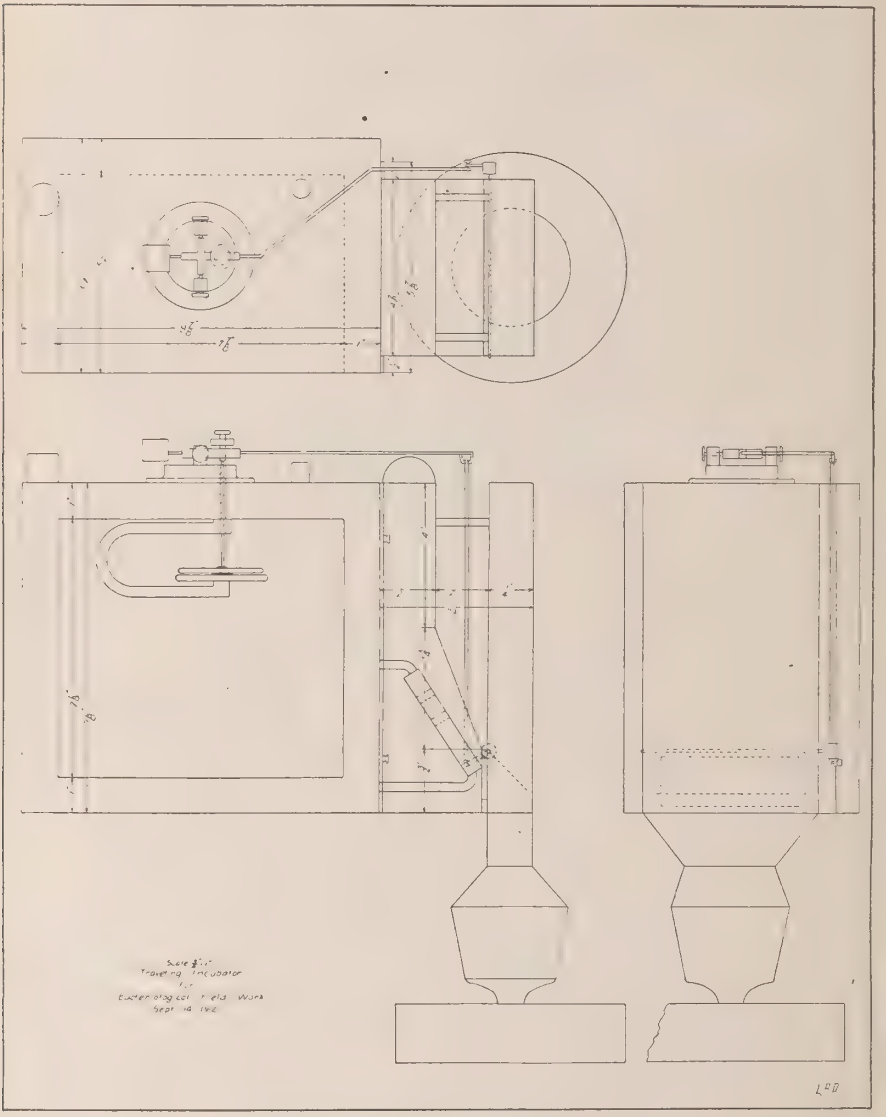

Fig. 6.—Field incubator showing dimensions.

of two disk-shaped, sheet brass receptacles superimposed upon one another, held in position on a metal arm within the incubator. On the upper one of these there is centered a small vertical rod which passes through the top

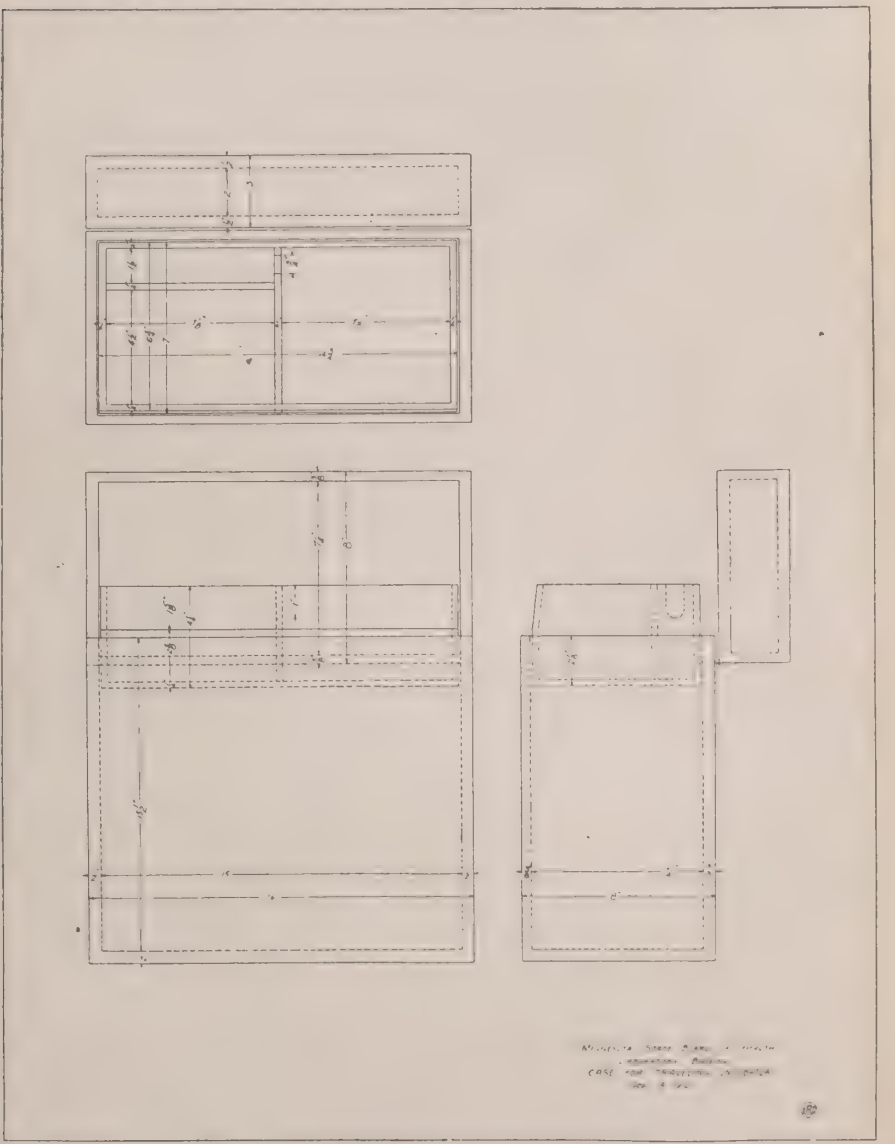

Fig. 7.—Incubator case drawings showing dimensions.

of the incubator and engages itself with the end of an adjusting setscrew which is held in place by a small iron casting. This casting is hinged on a cast-iron stand between two setscrews. To one end of the casting is attached a short rod carrying a weight for balancing purposes, and to the other end is a longer horizontal rod which hinges to a vertical rod near the end of the incubator. This vertical rod is in turn attached to the arm of the small door separating the heating shaft from the radiator shaft. The adjusting device consists of the setscrew in the horizontal arm which engages with the rod attached to the ether disks. This can be so set that the heat is automatically cut off at any given temperature from the radiator shaft by closing the small door when the heat will simply ascend through the heating shaft. Should the temperature fall below the desired point the ether compartments will contract lowering the horizontal rod and hence the vertical rod, and as a result the intervening door between the heating shaft and radiator shaft would be opened, thereby deflecting the heat into the radiator shaft. Sectional drawings are shown in Fig. 6.

The ether disk principle has been used for a considerable time, but its application in this manner to this type of incubator appears to be new.

The kerosene lamp used in generating heat has a capacity of 750 c.c. which is sufficient oil to last for 12 hours.

The incubator rests on a stand of suitable height which can be collapsed like a pair of scissors. The apparatus is packed in a specially constructed case shown in Figs. 2 and 7. The main compartment is just large enough to hold the incubator itself with the collapsible stand. The compartment in the lid carries the lamp, its chimney and the horizontal and vertical rods of the regulating device which can be easily detached, all of which are placed in a removable tray. The principal advantages of this incubator are: the ease with which it can be transported; the simplicity of its adjustment and operation; the rapidity with which a constant temperature can be obtained; and the fact that it is not dependent upon an electric current or gas for heating, so that it can be used practically anywhere.

This apparatus has received considerable use in this state in investigating water supplies, and has proved of very considerable service in obviating some of the difficulties which had previously been experienced.

By using the small inverted tube method for small amounts of water it is possible to apply the presumptive gas test for B. coli to 24 samples at one time and still leave one half the incubator space for petri dishes or some other purpose. The gas determinations for B. coli in 100 c.c. amounts are made in the regular laboratory glass-stoppered sampling bottles, 150 c.c. capacity, which are graduated to 100 c.c. These bottles are also equipped with the inverted tube before they are shipped into the field.

This outfit, while it may be used for any field operations, was designed primarily to assist in the routine investigation of water supplies as undertaken by the Laboratory Division of the Minnesota State Board of Health. A complete description of the routine methods for water investigations, as followed by this laboratory, can be obtained in the biennial report for the years 1911 and 1912.

HOUSING PROBLEMS.

THOMAS JORDAN,
Board of Health, Boston, Mass.

Read before the Massachusetts Association of Boards of Health, October 29, 1912.

This subject-matter is brought before this organization by the Boston Board of Health for the purpose of securing the coöperation of this Association, and, if the Association so directs, to have a resolution passed instructing your legislative committee to use all its efforts to procure the passage of the bills brought to your attention in this paper.

I adopt the title "Housing Problems" for the reason that the two bills spoken of embrace two of the worst problems as far as sanitary conditions are concerned with which the Board of Health has to deal. In Massachusetts a tenement house is a building which contains more than three families living independently and cooking on the premises. Up to the year 1892 the law governing the number of families in a tenement house included three-family houses. In almost all of the large cities of the United States, and particularly in the western cities, the law has been revised so as to include two-family houses; and I have been informed by the secretary of the National Housing Association that a movement is on foot in New York to make the two-family house a tenement house in that state.

There is no question but what three-family houses should be brought within the scope of the tenement house laws, as in houses inhabited by three families the conditions are, as a rule, such as to require inspection more than the houses containing a larger number of families for the reason that in the construction of such buildings the requirements are not as stringent as in the case of larger houses. A great many houses have been altered from single-family houses into three-family houses without providing the proper sanitary conditions, and in a great many of these houses the one water closet provided is usually located in the cellar where it cannot be properly taken care of. There is no question that the majority of these houses should be maintained under the same laws governing the care of yards, areas, water closets, whitewashing and the providing of ash and garbage receptacles, as control houses which contain a larger number of families. Conditions cannot be as good where there is a divided responsibility and where no one is entirely accountable under the law. In the tenement house the landlord is obliged under statute law to furnish proper ash and garbage receptacles; in the three-family houses the question of ash and garbage receptacles is governed by the city ordinances, which prescribe that no person shall place ashes or garbage except in proper receptacles, but no one can be convicted of violating this ordinance unless they are caught in the act of placing ashes or garbage in unsuitable receptacles, which, of course, it is almost impossible to do.

In the year 1911 the Board of Health, through His Honor the Mayor, introduced a bill in the Legislature providing for the inclusion of three family houses within the tenement-house laws; but this bill merely changed the word "four" to "three," so that the bill carried the fireproof construction clause for the three-family building as it has been covering the four or more family structure—and it was a foregone conclusion that the bill would be defeated in this form.

Three Family House.

In the year 1912 another bill was introduced which governed only the sanitary conditions required in buildings under the tenement house law, but the bill was again defeated. The Board of Health has been subjected to a great deal of criticism because of the conditions prevailing in these three-family houses; and it is astonishing to find that a large number of people interested in social and sanitary work do not know that three-family houses are not tenement houses. It is only a short time ago, in giving a short talk to the nurses connected with the Consumptives' Hospital Department, that the fact was brought out by me that these nurses were astonished to find that three-family houses were not legally included within the scope of tenement house laws, and that they can only be examined by the Board of Health upon specific complaint or when a nuisance is known to exist in the premises; although a great many inspections have been made in these houses upon complaint of visiting nurses and social settlement workers.

There is no question that if this bill was passed a great improvement would be made in the conditions of these three-family houses, as it would then be necessary for the Health Department to examine them semi-annually and drainage, overcrowding, whitewashing, care of water closets, yards, areas, and the providing of proper ash and garbage receptacles, would be looked after systematically.

Three Family House.

The next matter I wish to bring to your attention is the overcrowding found in the congested sections of the city. Under the regulations of the Board of Health 400 cubic feet of air space is required for each adult, and 200 for children under twelve years of age. This overcrowding exists mostly during the winter months, when laborers who have been working out of town during the summer floock into the city to lodge during the cold weather. A visit is made by the health inspector during the daytime, where apparent cases of overcrowding exist; a visit is then made at midnight as that is the only time when the number of persons occupying a room or rooms can be determined with positive certainty. Cases are frequently found where mattresses are placed on chairs, tables, and kitchen stoves, and last winter three men were found sleeping on mattresses placed on top of a piano. The only remedy under the present law for this overcrowding is a vacation of the premises. The rooms are measured and a vote is taken by the Board of Health stipulating the number of persons that may occupy the same. The walls of the rooms are stenciled as to the number, the owner is notified, and within a week another night visit is made to determine whether the rooms are still occupied in excess of the number allowed. This has to be done over and over again, and in some instances the same persons have been ordered to vacate premises every year for the last eighteen years. The Board of Health for the last two years has had a bill in the Legislature to make overcrowding a criminal offence, but these measures have been twice defeated.

Over-crowding.

The chairman of the Board of Health (the president here today, Doctor Durgin) and myself appeared before the committee of the Legislature and stated the facts as we found them, and pictures were brought to the attention of the committee which had been taken at midnight showing the actual conditons found. In 1911 the bill had leave to withdraw, but through the efforts of some members of the committee the bill was recommitted, and the committee expressed a desire to visit some of these premises during the night visits and five members of the committee made one of these night visits and then explained to the full committee the conditions as they actually found them. The bill was passed in the Senate but was defeated in the House. In the year 1912 the bill was again introduced into the Legislature and a hearing was again had before the committee; no opposition was offered to its adoption, and at the hearing a member of the committee, who was one of the visiting committee of the year before, made the statement to the committee that no matter how strong the statements were made in regard to this overcrowding, they could not begin to describe the conditions. There can be no question but what this should be made a criminal offence, as almost invariably where you find the families have children the children are obliged to sleep on the floors, almost always with their day clothing on, and then get up in the morning and go to school or go to work. This condition is not brought about because of poverty, and this fact is illustrated by the thirty-four cases brought into court during the year 1910; in every instance cash bail of $300 was furnished by the offenders; and in every case but one the offender was found guilty and fined from $20 to $50 (generally $50), and these fines were promptly paid on the spot. These different persons were arrested under the Public Lodging House Act which provides that no person shall conduct a lodging house for ten or more persons at a charge of less than 25¢ per night without being licensed by the police commissioner. These different offenders were found to be letting beds at ten cents per night in numbers ranging from fifteen to thirty-four. We happened to have a late spring that year. These people generally hire these rooms by the week or the month, but the spring was so late that year that they expected every day that they would have a call to go out of town to work. Instead of hiring their rooms by the week or month they started in to hire them by the night. One night, about half past one o'clock, in one of these houses a man who ran a restaurant on Garden Court Street in the North End brought in two men to lodge, and they paid ten cents apiece in our presence; and then we started an investigation and found out that they were all paying that price on account of the lateness of the spring. In one instance a man was found with sixteen lodgers, himself and wife, and three children, all sleeping in the kitchen, and four grown-up daughters, ranging from 16 to 22 years of age, sleeping in a dark closet; the offender worked for a salary of $12 per week, one daughter at $11, two daughters at $10 and one at $9 per week; and this case was seen by the members of the committee who made the night visit. There is no question that if this overcrowding was made a criminal offence it would break up the business; it is surely done for a profit, as second offences have occurred where they have been brought into court and fined. On the other hand, repeated instances are found every year for the last eighteen years of the same offenders who have been driven from house to house by order of the Board of Health on account of this overcrowding.

In visiting these overcrowded rooms it is always found that the windows are tightly closed and almost always covered, the doors closed, and a kerosene lamp burning in every room. The lodgers almost invariably wear all their day clothing, with the exception of the outer garments. Since the bringing into court and fining of the thirty-four defendants cited, it has been impossible to find any more cases, as both landlord and lodger always say that the room is hired by the week. In almost all of these cases where overcrowding exists the children are deprived of their beds and bedrooms, and it is no uncommon occurrence to find children, both male and female, twelve, fourteen and sixteen years of age, either sleeping with their parents in the same bed or in a small bed provided alongside of the larger bed. Very frequently grown-up boys and girls sleep together in order to provide room for lodgers, and very often cases are found where the grown-up daughters of the family have to pass through the sleeping room of the lodgers in order to get to the room in which they sleep themselves.

In most cases where this overcrowding exists the man who keeps the lodgers does not work, but his wife is compelled to do the washing and cooking for the lodgers, they providing their own provisions. I want to call your attention to the case of a man whom we have found conducting one of these lodging houses every year for the last three years and whom we have forced to move from place to place; he does not work, but for the last three years, upon a visit to his premises at half-past one o'clock in the morning, I have found his wife, a woman of sixty-five years of age, washing the clothing of the lodgers, and she has told me herself that she wished some means could be taken to prevent her husband from taking these lodgers and obliging her to do the work.

And now, ladies and gentlemen of the Association, in conclusion I would request this Association to do what it can to further the passage of these bills, as I have no doubt that the sanitary condition of Boston, as well as every other city in the Commonwealth, would be improved if these bills were enacted. I am sure that this would particularly be the case in regard to the bill treating overcrowding, as it certainly is discouraging for us to keep doing this work year after year, driving the same people from one place to another, when, if their profit was taken away by the payment of fines, the business would certainly be discontinued. If the Legislature of Massachusetts enacts a bill, as it did this year, making a three-family house a tenement house in towns in Massachusetts, it is certainly inconsistent when the same Legislature refuses to pass a bill making a three-family house a tenement house in cities.

The bill introduced by the Civic Service League of Massachusetts made a two-family house a tenement house, but at the last moment in the Senate it was changed from two to three. The president of the Massachusetts Civic Service League told me recently, however, that they were going to put in another bill this year making a two-family house a tenement house.

Discussion.

Doctor Chase. We have listened to a good paper this afternoon. I am glad that Mr. Jordan originally came from my town, Brookline, and has brought up this important question in the striking way he has, for it is a very strong indictment against a great evil, this overcrowding in tenements and this terrible congestion in certain places. Last week it was my good fortune to hear Mr. Jordan speak on this question at the State Conference of Charities in Haverhill. He spoke in the forenoon. In the afternoon Mr. Frederick C. Howe, of New York, now the head of the Cooper Institute, and formerly an alderman of Cleveland, Ohio, was one of the speakers. He is a man of education and wealth who has studied the housing problem in this country and abroad. He owns land in four or five cities, and so has a direct personal interest in the question; but at the same time he is a very public-spirited man and has studied the problem very thoroughly from every point of view. He said: "Friends, we have the housing problem. Why do we have to have a housing problem anyway? As the result of my investigations here and everywhere (and I will confess I am a land speculator) I have come to the conviction that it is all because we have an unsolved land problem. The land problem, or problem of the proper taxation of land, is not yet satisfactorily solved. When the land problem is solved we will no longer have this housing problem that causes so much agony among social workers and sanitarians and health officers."

The indictment of Mr. Jordan is a perfectly just one, but if we do succeed in punishing the owners or the men who let these cheap tenements for allowing more than one proper number of men and women to be crowded into them, will that remove the cause of it? Of course it will not. We have got to go deeper than that. It has been shown by Mr. Howe and others that if only we will tax the improvements that are made upon land less and less each year until all taxes upon the houses, stables and factories are removed to the land value, *i. e.*, the value of the land they rest upon, and if unoccupied land in the cities is taxed for its real value, the value that could be made of it if properly employed and improved, then by that process in a very few years, almost fifteen or twenty years, the whole tax would be transferred to the land. That would work out in the case of homes such as most of us occupy in taxing our houses, our stables, our garages, our factories, nothing at all, and raising somewhat the tax we now pay on the land. That single tax on the land value would be much less than the sum total of the tax now paid on our house and stable and land.

In the cities, as you know very well, in Boston and in New York, in every large city in the United States, we have large areas of unoccupied land within the city limits. Look at Brighton and other places close to the factories and tenements where our workers live. We only need to stop punishing the owners of tenement houses and other buildings for putting those improvements on them to encourage them to build. They could then build and get their four or five per cent., and could lower the rents to the occupants —that is the important thing - lower the rents to the occupants and still have their profit. The first step in that direction would be to have a law passed in our Legislature, such as came up last year and the year before, calling for the right of towns and cities to have local option in the matter of taxation. Then they could adopt the plan of increasing the tax on land values, at the same time reducing the tax on buildings, thus bringing about the single tax. In that way our land problem would be solved. Then our housing problem would disappear because we would have ample accommodations for the boarders and lodgers who now are crowding in to the tenements of the people who are willing to take them for the small sum of ten or fifteen cents a night.

I am in sympathy with the bills which Mr. Jordan advocates and think they will undoubtedly pass. At the same time, we must not forget that we must go deeper and educate the public, which is now so ignorant or so stupid that it does not see this way out of its dilemma, and thus get rid of the land speculator, the land problem and the housing problem. In England they are already starting out on reform in the direction of the single tax, also in many cities in Germany, and recently in Vancouver.

SOME PRACTICAL CONSIDERATIONS ON THE PRESENCE OF LEUCOCYTES AND STREPTOCOCCI IN MILK.

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Read before the Massachusetts Association of Boards of Health, October 29, 1912.

There is, of late, a great awakening of interest in matters pertaining to health, and this interest is engaging the attention, not alone of physicians and health officials, but, what is of vast importance, of the public as well. We need only look at the daily papers to see to what extent this is evident. Various health matters are being brought before the people but hardly one with such repeated insistency as that of pure milk; this has become a public question, and it is good that such is the case.

Of the various questions pertaining to milk it seems to me of pressing importance that we recognize some practical method whereby we can determine infected milk and thereby take effective steps to exclude such from the market. The question of pus and streptococci in milk has long been disputed. Many views have been expressed upon it, some claiming one thing and some another. I want, in this paper, to bring before you certain practical views which have proven of value in excluding infected milk from the Boston market.

Is this an important question? Every question pertaining to health is important. Has this a bearing upon the question of health? Is the presence of pus and streptococci in milk apt to effect the health of the consumer?

In the report on milk by the U. S. Public Health Service ten well-known authorities are cited who claim to have seen epidemics of sore throat, enlarged cervical glands, intestinal disturbances and fever, which, they say, were found to have been caused by the drinking of milk containing streptococci and derived from herds among which were cows with inflamed udders. Holst, one of the investigators, drank 200 c.c. of the suspected milk, and soon after became ill with colic and diarrhœa.

About two months ago I found pus and streptococci in a sample of milk sent in from a children's hospital; at that time, as I learned later, an epidemic of vomiting and diarrhœa broke out among the babies at the hospital, and was so severe that a number of the children died. On receiving my report the milk supply was investigated at the farm where it was produced. Two cows were found suffering from mastitis; these were removed from the farm and thereupon the epidemic ceased.

From these facts we must admit this question is of importance since they prove that infection has been caused by the drinking of milk containing pus and streptococci due to mastitis in the cow.

In milk, what constitutes pus and what is the significance of streptococci? When speaking of pus we always think of increased polymorphonuclear leucocytes—yet I think it questionable to say that the evidence of pus as seen in milk, consists solely and essentially of an increase in leucocytes. We may find pus in cases where the leucocytes, though somewhat increased, are not increased to such an extent as to be the sole factor in determining our judgment; where, were we to depend upon this increase alone, we might not claim the presence of pus; but when with the leucocytes we find pus-producing organisms in close relationship, the condition is sufficient to determine the question. You can understand how this may be so, where one is examining an infected milk, which had been mixed with a large amount of non-infected milk; in such a case we might find a relatively low number of leucocytes and yet pus may be present.

However, in many cases we must depend upon a marked increase in leucocytes and this is often the only evidence to be found. Then comes the old question—how much of an increase is necessary to establish the presence of pus? We can determine the abnormal only when we know the normal. All milk contains these elements and the number in any given milk is found to vary from time to time, leucocytes in milk not being limited as they are in the blood. We know they are increased during the early days following calving and when the milk secretion is drying up. Many have tried to determine the normal number of polymorphonuclear leucocytes in milk; the limits of variation found being generally from about 10,000 to 500,000 in a cubic centimeter. The number found will vary with the method used; less being found by the smear and stain method than by the Doan Buckley method.

As to the Doan Buckley method—it is undoubtedly accurate but it requires more time than can always be given by one doing milk work for a large city like Boston. It is claimed that if the milk is momentarily heated at 70° C. we can obtain results about as accurate by the simple smear method as by any, and it requires but little time.

Stone and Sprague with the Doan Buckley method, counted the leucocytes daily during the entire milking period, using two cows for this purpose, and the counting altogether 1,167 samples. Of these,

1 1-5 % showed leucocytes below 10,000 per c.c.
7% showed leucocytes between 10,000 and 20,000 per c.c.
61% showed leucocytes between 20,000 and 100,000 per c.c.
29% showed leucocytes between 100,000 and 500,000 per c.c.
and only 1% showed leucocytes above 500,000 per c.c.

From this work they concluded, that the physiological average is considerably below 500,000 per c.c. and they state, "very seldom would the mixed milk of ten cows go above this figure unless there were present abnormal conditions in some of the animals." With the two cows selected by them the average was above 500,000 only three times in a total of 538 counts.

The average variations quoted by most investigators, including those of Stone and Sprague, are based upon examinations of milk from single cows. No two cows' milk will be found to contain the same number and the number in the milk from any given cow is found to vary from time to time. We ought not to regard, nor interpret the findings in the milk of one cow nor of two cows, in the same way as we would a mixed milk and this is a practical point to be considered when examining municipal market milk which is always mixed.

At any given time some cows show a high count, some a low count. Investigators have found a larger percentage of low counts than of high. Although these differences, which will obtain, cannot be expected to act as a fine adjustment, equalizing a mixed milk to any given number yet, we are justified in expecting that the variation in numbers should, under normal conditions, be confined within narrower limits and so would not show such a number of high counts as are found now and then in the milk of one or two cows.

The rule followed here in Boston during the past six years has been that in the sediment of two cubic centimeters of milk smeared over an area of four square centimeters and examined by a $\frac{1}{12}$ oil immersion lens, any sample showing fifty or more leucocytes to a field is regarding as containing pus.

Some claim that the cells which have been long regarded as leucocytes are epithelial cells from the lining membrane of the milk ducts of the cow's udder and not leucocytes. With such a view I cannot agree for the reason that epithelial cells are mononuclear whereas those considered as bearing on the possible question of pus are polynuclear. True the epithelial cells do, when dividing, appear as polynuclear cells but they do not divide with such rapidity as to number from 500,000 to several millions to a cubic centimeter, and again the sediment of milk from a tubercular udder in which the presence of pus is not disputed shows an immense number of these polynuclear cells.

Personally since the determination of pus, except from the presence of pus-producing organisms, is, as yet, an undecided question, except in instances where field after field is crowded with polynuclear leucocytes matted together, I think we are, as yet, not justified in taking a determined stand upon the presence of pus in milk based solely upon the number of leucocytes present. Yet, I think it practical, that every milk sample showing over 60 polynuclear leucocytes to a $\frac{1}{12}$ oil immersion field should be marked suspicious and receive special attention, the cause where possible being determined. From such findings we have in the past discovered many tubercular cows which up to that time had passed unnoticed, their milk going to market regularly, and I hope that by systematically carrying out such an investigation over an extended period, we shall be able to take a more definite stand on the question of pus.

Certainly where field after field is crowded with leucocytes one would not hesitate to claim pus present even though no bacteria were evident. Such a finding should lead us to test for tubercle bacilli.

Apart from the number of leucocytes their arrangement, relative to each other, deserves consideration. At times we find many leucocytes but they stand more or less apart from each other single and discrete. Where pus is present the leucocytes tend to be bunched and, as it were, matted together and often we find closely associated with them the streptococcus.

Practically all milk contains streptococci and at times the streptococcus lacticus may reach as high as from 50 to 90 per cent. of all germs present, depending much upon the age of the milks and the temperature at which it has been kept. We know that cows are often affected with mammitis, hence, the occasional presence of streptococcus pyogenes in milk is to be expected.

Having examined over 10,000 samples of milk I almost daily see the streptococcus lacticus, but examining from 500 to 800 samples a month, only occasionally, say three or four times a month, do I see the streptococcus pyogenes.

When doing municipal work it is necessary that we use the quickest methods possible consistent with accuracy, since, when any condition is found that may possibly be a detriment to the health of the consumer, we must immediately trace such to its source and isolate either the cow or cows at fault. Were we to follow methods that require several days you can readily see how much time would be lost.

We know the streptococcus lacticus is the least harmful of all germs ordinarily found in milk; in fact at times it is beneficial, particularly in the making of milk products, and to condemn milk for its presence would be, not only folly, but an injustice. Were we to do so, we would have to condemn all milk, as it is found in practically all milk.

Though the least harmful of milk bacteria it should not be present in great numbers. If so, it is an evidence that the milk is either old or has not been properly cooled, the latter being the more probably since streptococcus lacticus grows best at about 70° F.

How, then, shall we differentiate between the streptococcus lacticus and the pyogenic streptococcus? Many methods have been tried by various investigators. Some have relied upon the power of the streptococci to ferment various carbohydrates. Bergey claims to have found that the streptococcus pyogenes is able to ferment lactose and saccharose, but does not affect salicen, sorbite, raffinose, nor inulin; whereas the lacticus, ferment lactos, saccharose, salicen and raffinose but does not affect sorbite nor inulin. Yet again he found that some streptococci isolated from milk were able to ferment all the carbohydrates used. Hence we cannot rely upon the fermentation method.

Blood agar tests have given fair results, but they are not absolute, since streptococci other than the pyogenic have been proven capable of producing haemolysis. Muller found that milk streptococci (by which I suppose he meant streptococcus lacticus) were almost as often hermolytic as the pyogenic. Hence we cannot depend absolutely upon the test for haemolysis. So far cultivation on various media has given no distinguishing points.

Bergey has also tried out the acid agglutination test. This was based upon the work of Michaelis, who claims to have differentiated the B. typhosus from the paratyphosus and the B. coli; and Bergey had hoped by this method, to have been able to differentiate the various strains of streptococci, but he tells us with very unsatisfying results. As he states, "Some of the cultures showed complete agglutinations in all dilutions, others showed no agglutinations in any dilutions, while others showed varying degrees of agglutinations. These methods have not proven satisfactory and further more they all require too much time.

We want a method whereby we may be able to immediately recognize the presence in milk of streptococcus pyogenes so as to be able, without delay, to prevent the further placing of such milk upon the market.

Can we depend upon the microscope to determine the presence of pyogenic streptococci in milk? I think we can.

When we find streptococcus pyogenes in milk, we naturally expect to see with it evidences of its pus-producing property, we expect to see pus. Whereas with the streptococcus lacticus since it is not a pus producer, we do not expect to find pus even though the organism is present in very great numbers. I do not understand why some claim that because streptococci are present in milk in great numbers, such milk should be judged infected. We at times come across samples loaded with streptococci but showing no pus, no evidence whatsoever of an inflammatory process, and it is undoubtedly a mistake to say that, because streptococci are present in great numbers, that from this fact alone, we can conclude that they are pyogenic.

Again some have said that streptococci forming long chains are pyogenic while those forming in short chains are non-pyogenic. The length of a chain is not an essential factor. True in most cases the pus producers grow in long chains, particularly in milk, while on the other hand, the streptococcus lacticus generally grows in short chains, but this is only accidental and not an essential difference. The division of streptococci into streptococcus longus and brevis is not tenable, as a short chained streptococcus grown on another medium often appears as a long chained streptococcus. So when examining milk, if we find streptococci present, even in large numbers, whether the chains be long or short, if no pus is present, we are not dealing with streptocóccus pyogenes. On the other hand, if we find only a moderate number of streptococci and these are accompanied by, and intimately associated with, polymorphonuclear leucocytes massed together, we are justified in claiming the presence of streptococcus pyogenes. With the streptococcus lacticus we may find a fair number of leucocytes, but they are not closely associated with organisms but stand apart from them; I mean the general picture so impresses you. You may find occasionally a few leucocytes and streptococci together, such is to be expected, but it is not particularly characteristic. Whereas in an infected milk the picture is characteristic; here we see streptococci absolutely surrounded by polymorphonuclear leucocytes, as it were, buried within a mass of these elements, and whereever we see the streptococci we find the same identical picture showing an intimate, close relationship between the streptococci and the leucocytes. Between these islands of leucocytes, in the clear spaces, we see no streptococci. This is the picture to which I wish particularly to call your attention. This is the finding upon which I base my judgment, and it is from such findings, that we have traced many infected samples to the dairies and in every case found conditions warranting the condemnation of the milk.

Coming down to a practical working basis; the fermentation method, the hemolytic method, the acid agglutination method—none of these have proven their value; whereas on the other hand, our findings at the dairy have confirmed our stand on the value of microscopic examination for determining the presence of pus and streptococci pyogenes in milk.

Some of the conditions traced to the dairies from our laboratory findings are:

Inflamed udder	47 times
Tuberculous	8 times
Portion of udder atrophied	4 times
Cows recently calved	40 times
Cows drying up	20 times
Sore teats	4 times
Cow with partially retained afterbirth and foul discharge	1 time

Hence milk at times contains virulent pathogenic streptococci. When present evidence of an inflammatory reaction will be found and thereby distinguish them.

Since many epidemics have been traced to this cause, with death in some cases, it is the duty of health officials, to safeguard the public from such milk. This can be done by microscopial examination. All such milk should be excluded from the market immediately and those having it for sale should be punished. It is within the power of the large milk contractor to prevent such milk going for sale and should they fail to do so they deserve punishment.

The two accompanying photographs show the difference between the lacticus and the pyogenic streptococcus. The person who made the photographs did not pick fields such as I would have wished. I would prefer for the streptococcus lacticus to have a field showing longer chains, because sometimes we get the lacticus showing quite long chains, although as a rule not as long as the pyogenic. I would also prefer a field with a large number of leucocytes and not one absolutely free from them.

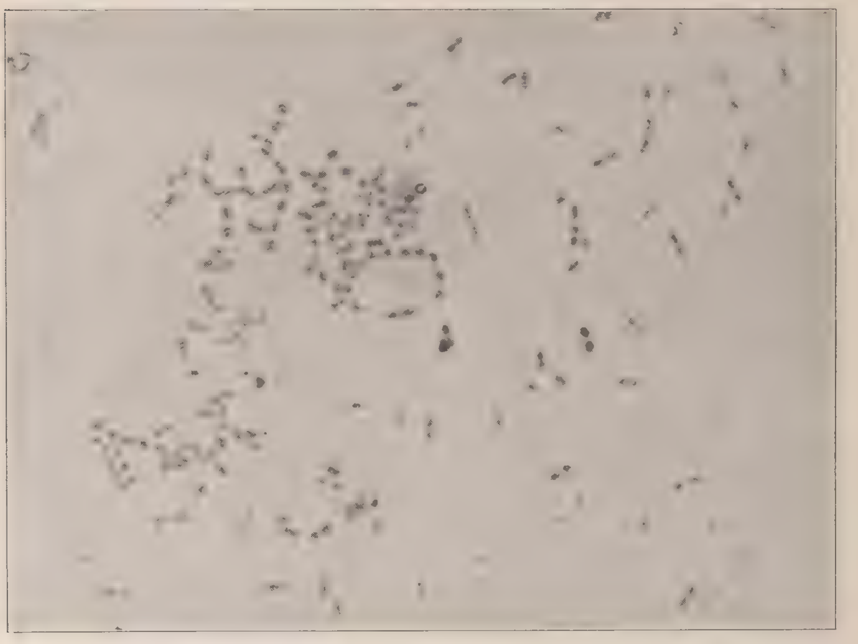

Fig. 1.

Fig. 1 shows the streptococcus lacticus. There is one point here of differentiation between the streptococcus lacticus and the pyogenes. The streptococcus lacticus tends to break up into diplococci, the pyogenic does not. We have here a large number of streptococci, but no evidences whatever of an inflammatory reaction.

Fig. 2 is a different picture. I had hoped also in this picture to get a

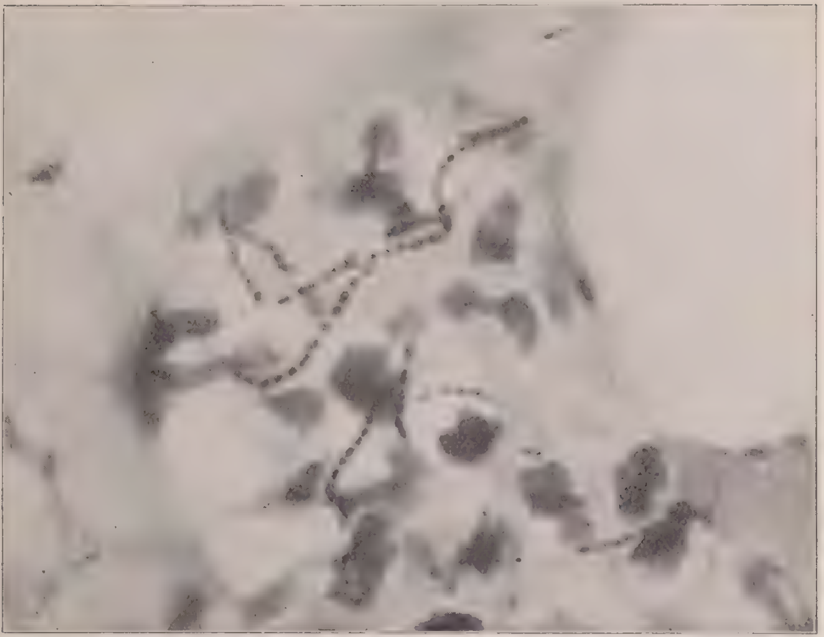

Fig. 2.

more general view, with less of the detail, so as to have several bunches of the infected material showing. Here the streptococci are intimately associated with the leucocytes; they are buried right within them. And in an infected milk we find all through the slide such islands of leucocytes and streptococci as the one shown in this picture, and in the clear spaces between these masses of leucocytes and streptococci we generally see no streptococci. Wherever we find the streptococci we find the leucocytes closely associated with them. That I think is the distinguishing point. By means of such a microscopic picture we have isolated many infected cows at the dairy.

Discussion.

Doctor Denny. I would like to ask Doctor Scannell whether epidemics of streptococcus infection in human beings have been traced to streptococcus infections of cows.

Doctor Scannell. Yes. In the report by the Marine Hospital Service on milk, a work which was carried on under Doctor Rosenau, mention is made of ten different authorities who claim to have found epidemics which they proved to have been due to the drinking of milk infected with pus and streptococci.

Among them is Holst of Christiana. Holst himself took some of the milk at the time, drank 200 cubic centimeters of it, and was taken violently ill with colic, diarrhœa and fever, showing symptoms, the same as those shown by a number of people who had previously been infected. That is but one of the epidemics that is spoken of in this report of the Marine

Hospital Service. As I say, in that article there is mention of ten different epidemics reported by ten different investigators.

"In Anglesea in 1897 fifteen people who took milk from one dairy became infected at about the same time with sore throat. Several persons in the affected families, who consumed milk from the same source, but in a boiled state, escaped the sore throat, the chief evidence of which was tonsilitis. The bacteriological examination of the milk revealed the presence of streptococci pyogenes and staphylococcus pyogenes, but no diphtheria bacilli. Bacteriological examination of patients' throats yielded precisely similar results.

Of course we know that an examination of the throat in many normal persons will show streptococci present, but there are many cases of infection from milk cited, by different authorities.

Our high infant mortality, we know, can be traced in great measure to the feeding, the greater number of deaths occurring among bottle-fed babies. Such cases can be divided into three classes; first, cases of improper feeding ending in malnutrition and marasmus; second, cases of cholera infantum due, I believe, in most instances to toxine produced in the milk by numerous miscellaneous bacteria, and thirdly, a large number of deaths among babies is due to infection of the alimentary tract caused, I believe, many times by milk derived from cows suffering from mastitis and containing virulent streptococci. It is for these reasons that I think producers who put such milk on the market should be punished, I don't mean the small store dealers and such who are unable to determine infected milk, but the large milk contractors. These all have bacteriological laboratories and it is within their means to determine such milk and prevent it going to the market.

Within the last month the Boston Board of Health summoned to court two of the largest milk contractors in the city. They were found guilty of having infected milk for sale and each paid a fine. I think most health officials have been sort of timid about citing contractors to court on the finding of pus and streptococcus in milk but it has been done and they have been found guilty.

MEDICAL INSPECTION OF SCHOOLS.

Robert W. Hastings, M.D., A.M.,
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Read before the Massachusetts Association of Boards of Health, October 29, 1912.

The interest which the state takes in the health of its citizens finds its latest expression in the care of youth. Healthy children and young people must of necessity remain possessed of this same vigor when they become adults. Theory is supported by facts, as, for instance, in New York City, where in 1866 the average age at death was twenty-seven years while now it is forty-three and the annual death rate has decreased from thirty-five to less than sixteen per thousand. This is during the existence of the present health department. *The gain has been chiefly in the early age periods.*

Throughout the civilized world education is to a large degree compulsory. Few things so much interfere with the school work as sickness. Hence, there has always been considerable coöperation between health boards and educational authorities. The latest move in this direction is in the medical inspection of schools.

Undoubtedly the primary object of this inspection was to lessen the incidence and to prevent the epidemics of so-called contagious diseases. In more recent years, however, hygienists, having given much attention to the health of factories, stores, mines and various other places of adult occupation, have come to appreciate the importance of the school buildings. Typhoid fever, tuberculosis, malaria are found to be preventable, and so, too, may be many of the deformities and defects of development of early life. There has, therefore, appeared a much wider field of medical inspection which must nowadays include not only the consideration of contagious diseases, but also a study of all the children from the point of view of health and physical perfection. These United States, England, Canada, Germany, France, Norway, Sweden, Switzerland, Portugal, Japan, are the countries which have in a measure at least entered upon this broader field of medical inspection. The interest appears to be more general in England than elsewhere. Nearly every issue of the great English medical journals contains reports and papers along this line.

In this discussion, the broader subject of "school hygiene," so closely related, has been only touched. Books--many of them very good ones—have been written upon that. But the subject is here limited.

We assume that the medical inspector is a well-educated physician. He must be interested in hygiene, in education and in children. Lacking in either of these he will not succeed. Hygiene, treating of "the laws of health and the methods of their observance," has not in most medical schools the prominence which it has at Harvard, nor has it always been accorded that position there. But will you find even in those great laboratories this broader field fully taught? Can one learn there all that one may need to know in regard to food, sleep, exercise, physical culture and mental training in order to wisely guide children? His interest in education will lead the medical inspector to a true estimate of the relative importance of the various portions of this study of children. Manifestly school routine must not be interrupted for reasons that are purely speculative. On the other hand, studies or methods of study which are physically harmful must be wisely limited or adapted. A real interest in children will give the medical inspector the same success in his work which the same quality gives to the teacher. Work that is merely dull routine—a method of earning one's living—will not in either case be of the highest value.

But can such men be obtained? Not in large numbers until the pay is made adequate. While cities and towns continue to expect medical men to do this work for a nominal pay from purely philanthropic motives no great general advances will be made. Here and there a man possessing the qualifications and training and with independent means will do a great work.

Our first plea, therefore, will be for properly equipped medical inspectors, adequately paid.

For convenience we use the masculine pronoun in this paper. But we believe that in many places, especially wth older girls, as good, or even better, work can be done by the female medical inspector and do not wish to appear to exclude her from this branch of medical work.

Only to a limited degree will the work of the medical inspector depend upon the location in which he works. Mankind generally, children everywhere, are pretty much alike. He will concern himself first with the communicable diseases. Smallpox, scarlet fever, measles, German measles, chicken pox, diphtheria, poliomyelitis, tonsilitis, whooping cough, mumps, pediculosis, scabies, ringworm, impetigo contagiosa, trachoma, venereal disease, tuberculosis, influenza, will be promptly detected by him, their isolation for a suitable period advised and readmission allowed upon full recovery. This work demands entire accord between the medical inspector and the health authorities of the community. He will also certify to the vaccination of the pupils. In most cases, the inspector is forbidden to give directions for the medical care of these children whose exclusion he advises or requires. This is because of the attitude taken by the family physicians who are jealous of any such intrusion within their special province. But it seems as if ambulatory patients with mild infections may soon come to the school physician for advice when parents desire it and thus the work will be unified because diagnosis will be followed by treatment, as should be the case in medicine.

Secondly, the medical inspector searches out remediable defects in the scholars under his supervision. Here will be noted defects of hearing, vision and speech, of breathing, posture and growth, of walking, standing and sitting, of the teeth, the lungs, the heart, the skin, the nervous system and the circulation. This involves, as you will see, not alone a careful study of the child busy in school, but also a thorough physical examination. Moreover, the observer must be an "all around expert," that rare individual who is so apt to be "Jack at all trades, and master of none." This has led to the employment wisely, we believe of oculists, aurists and dentists to supplement the work of the regular inspector. True, he may perfect his knowledge and technical skill so that he will be able to tell surely whether the eyes, nares, pharynx, eardrum, or teeth need treatment or not, but few besides the specialists are wise enough now. The importance of this phase of medical inspection can hardly be estimated. Everywhere, when made, the examinations have shown very large percentages of these defects. Seventy-five per cent. of children show some defect! Teachers may be able to say that a child does not see well or hear well. But the reason is quite out of their province. The education of many a boy or girl has been rendered difficult or even entirely stopped because he could not see or hear the instruction as the other children did. The loss to the community in money wasted in attempts to teach such a child and in the future untrained mind which so readily becomes criminal is untold. Judge Mack said, "There is a straight road from adenoids to the penitentiary" and all the first part of this road is within the school life. Kyle's statement that 90 per cent. of those having adenoids are more or less deaf shows where the difficulty begins. Inability to hear is discouraging. Speech is limited and mental development is thereby stunted. Called a stupid child he soon becomes vicious. Defects of vision are in this state noted by the teacher who makes an annual test. There seems no good reason why this should not be done by the medical inspector or better by the oculist. Of 2,000,000 English children who were thus examined, 10 per cent. were found to have defective vision. Dental decay is readily noted in most children. Authorities differ as to the best measures for prophylaxis but agree that prompt skilled treatment is imperative. Neglect means deformity of the jaw, inefficient mastication, sources of constant supplies of toxic material and foci of disease which may even threaten life. A full set of sound teeth is a health asset to the adult not possible of computation, and is to be secured only by early care of the permanent teeth. Indeed, this has been so positively recognized that in many places already school dental clinics have been established, where dentists, paid for all their time, care for the teeth of the scholars. It is said that one dentist can care for the teeth of three thousand children in a year.

Whether the medical inspector is assisted in these problems by the specialists or not, he will find plenty of other work at his hand. Removal of hypertrophied tonsils and adenoids still leaves the necessity of special training and other measures to meet the underlying hypoplastic condition. As the child sits at his study the trained eye may detect anæmia, malnutrition or spinal curvature. As he walks in marching, a limp may tell of a defect of foot, leg, thigh, hip, or spine. As he goes through gymnastic drill there will also appear defects of the trunk and upper extremities. Posture tells much of the weakness of groups of muscles and unless these muscles are properly strengthened permanent deformity results. All of this and more will appear if a full physical examination is made. Evidently the trend of the movement is in that direction. A record of such a physical examination showing height, weight, nutrition, condition of heart, lungs, spine, glands, joints, muscular development, nervous equilibrium, and besides these, the reports of the specialists, would be of great value as a guide to the removal of all remediable defects. There will be a few cases of heart disease thus detected and a still less number of pulmonary tuberculosis. But this information in these cases will be of the utmost importance to the health and even to the life of the child. Thirty-five out of every hundred who die of tuberculosis die between the ages of fifteen and thirty. This fact alone would show that the medical inspector of school children must ever keep this disease in mind, even though he will see few frank cases of it. Malnutrition and anæmia among the poor have in many cases yielded to the healthful school lunch which serves not merely as a supply of good food, but also as a concrete example to the child of the food he ought to have. The detection of muscular weakness allows for the recommendation of suitable exercises and the prohibition of others which under the circumstances would be harmful. There will be found nervous children who stutter and who will always have that impediment unless trained early. Habit spasms may be seen and now and then a case of petit-mal or even of grand-mal. Eneuresis, too, which rarely meets any consideration from the teacher, will be recognized and its treatment suggested. Occasionally a teacher will refer a case of thigh-friction, horrified that any such thing can be possible. Mild chorea will be at once detected and severe cases prevented. Rhachitis, suggested perhaps by superficial observation, is proven or disproven by the physical examination.

There are practical objections to such a complete examination, it is true. The time and labor involved are considerable and the expense is proportionately large. In favored communities the important defects thus discovered are few—we are not at this point speaking of the eye, ear, nose, throat and teeth which are almost as frequently affected among the well-to-do as among the poor. In cities children are continually moving from one school to another, thus preventing their observation through any consecutive number of years. A large proportion of the records, therefore, will be of no value after the first. Germany's paternalism may make such a record of physical condition of real advantage to the state. But so far it apparently has not done so, for of the German youth who were examined for military service last year, nearly 50 per cent. were rejected. In America the people will not endure any such limitation of liberty to live where and as they choose.

These objections have led many authorities to adopt a system which is not scientifically complete or exact but full enough to allow the medical inspector to give immediate advice to evidently defective children.

Thirdly, the medical inspector will note the irremediable defects, physical and mental. Such are cripples not amenable to surgical treatment, the blind, the deaf and the mentally deficient. The teacher readily recognizes the defect and in most cases diagnoses correctly.

But the properly trained medical man alone can be sure of the exact condition and say whether relief or cure is possible. If not, he should also know the place the child can be made most fully self-supporting or the methods which must be used to bring about this end. Again, is the demand for expert knowledge not usually a part of the physician's equipment and emphasis is again laid upon special preparation for this work. There are schools for crippled children, the blind, the deaf and the mentally defective. Here, and here alone, can such youth be made self-supporting. Yet even the medical profession are but little informed about it and the general community looks upon such compulsory training as contravening personal liberty. Only very recently has the obstruction which such children furnish to the regular process of education of others been recognized. Some of these are border-line cases and the medical inspector alone will detect them. Though few in number, the saving to the community in their proper care might easily pay all the expense for adequate medical inspection of the schools. Two hundred and fifty thousand children are said to drop out of the schools of the United States because of physical disabilities each year. To hold a large per cent. of these will be one great result of medical inspection.

Fourthly, the medical inspector will conserve the health of the children whom he finds well. Exclusion of contagious cases, gradual restoration of defectives to normal health, removal of permanent defectives to more suitable training schools, do all lead to the continuance of the well child in health. But there are other phases of this part of his work and these at once lead into the larger realms of school-hygiene. Scholars are influenced not alone by the health of other pupils, but also by the health of teachers, by the air space, heating, ventilation and lighting of the schoolroom, by the seats and desks, by open air rooms and outdoor classes, by clothes racks, by drinking water, by school lunches, by clean floors, by the relative amounts of "reading, writing and arithmetic," to say nothing of the score or more of other subjects in the curriculum, by the length of school sessions and study periods, by the amount of home studies, by habits of standing and walking and of sitting while reading or writing, by the calisthenic drill, by their sports and games. With regard to all these points the medical inspectors may be expected to have well-founded opinions and to give advice. Of course he must recognize the position of others who are equally concerned in the education of the child, but he must stand firmly for the prime importance of health, without which education is of little value.

"The health of the people is the supreme law" and in no way can this general healthfulness be more promptly effected than through the children in the schools. This desire to influence the community through the children may lead to their instruction by the medical inspector. Health lectures, especially if aided by the visual impressions to be derived from charts and stereopticon pictures, may be easily one of the most valuable services a medical inspector can render. Especially does this seem to be true of tuberculosis and of matters of sex hygiene now so much in the public eye.

This outline presentation of the subject of "Medical Inspection of Schools" clearly shows the opportunities for such work. There remains one topic which demands at least a word. What shall be done? In many communities disease and defects have been discovered by the medical inspector but nothing has been done to remedy those conditions. Manifestly this is a great waste of effort. The school nurse is a real aid. Part of her work is preliminary to that of the doctor at the school, but most of it is supplementary. In some places she is allowed to examine throats and teeth, make cultures or even clean teeth. Usually, however, her work is at the homes, to follow up the children there and if possible secure treatment. Many a child is taken by her to the dispensary or hospital, whose parents would never attend to the condition. As a social worker, too, she exerts a direct powerful influence on the health of the home which is not less important to the health of the child than the health of the school. School dental clinics in England are fairly numerous and so successful that general school clinics have been established in many places. Some of these are in hospitals or dispensaries already existing. Others are in the school buildings. It would seem that in these and in these alone can the 70 per cent. of carious teeth, the 30 per cent. of diseased tonsils or the 20 per cent. of adenoid obstruction be remedied. Certainly this next step must be taken and taken soon, or else the careful work of the medical inspector will be much of it useless, his interest will necessarily lag and the community will suffer.

45 Kilsyth Road.

Discussion.

Doctor Gallivan. One can hardly speak of medical inspection of schools without almost unconsciously mentioning the name of Doctor Durgin. It is a matter of history that Boston was the first city in this country to introduce medical inspection of schools as far back as 1892, and it has been carried on down to the present time under his guidance and support.

I am very glad that Doctor Hastings alluded to the requirements and conditions in his paper as being ideal, because as he read it the thought came to me how much time would be left for educational pursuits.

The recommendation to employ specialists to conduct these examinations and to establish clinics in the school buildings for the correction of defects does not appeal to me. It has yet to be proven that the people of Boston are so utterly devoid of parental instinct and parental responsibility as to be entirely oblivious of their offspring and their welfare.

On the other hand, comparing this year's physical examination with the physical examination made in 1911 of 2,000 children, we find 70 per cent. of the children are without defect as against 35 per cent. reported without defect in 1911. Comparing this list still further, we find that corrections have been made during the past year as follows:

Defective nasal breathing	54 per cent.
Cervical glands	50 " "
Defective teeth	40 " "
Hypertrophied tonsils	42 " "

Statistics dealing with such small numbers may not be of much value, but it is encouraging to note that parents in Boston are able and willing to care for their children once their attention is called to conditions which require treatment. The widespread prevalency of physical defects among school-children of all classes does not call for the usurpation of the parents' obligations. The average citizen is not supposed to be versed in medical, dental and hygienic affairs, about which no effort has been made until the present time to provide information; and the present system, as being carried on in Boston of informing parents of defects, of explaining to them the necessity of having these defects corrected has an educational value which warrants the prediction that the future pupils will enter school far better equipped physically than their predecessors and for the present seems all sufficient.

Doctor Chase. Mr. Chairman, I have spoken once; I will speak once more in order to discuss this question. I can echo what Doctor Gallivan said in ascribing credit to our chairman, Doctor Durgin, as the pioneer in this movement of medical inspection of school children. He confided to me just before he put it into operation the splendid plan of medical inspection for the Boston schools. Being a smaller place than Boston we in Brookline were able to start at just about the same time as Boston started with the school inspection, and we have kept it up ever since.

I shall not touch on all the subjects that my colleague, Doctor Hastings, has spoken of to invite discussion, but he has spoken of the great importance of the coöperation of specialists in making the examinations and repairing the defects found in school children, and especially the help we get from the dental profession and the specialist in the throat, nose and ear. As you well know, of the 65 or 66 per cent. of children in Boston who have physical defects requiring treatment, some 87 per cent.—Doctor Gallivan will correct me if I am wrong—have defects needing treatment, have defects in their teeth or in the throat, nose or ear, and therefore the importance of those specialists I mentioned, dental and throat, nose and ear.

In Brookline, for the past six or seven years, we have had the active assistance of Professor Potter of the Harvard Dental School in supervising our dental inspection, the actual work being done by four young dentists, and we have had three excellent throat specialists to help us about the throat, nose and ear inspection. Our difficulty, however, has been in getting the repair work done. In the past year, largely with that in view, some of us here were able to get through our town meeting a vote carrying an appropriation of $2,000 a year for a hospital relief fund, and we most of us had in mind that dental repair work would come under the head of surgical relief as much as relief in the case of a broken leg or any other branch of surgery, but the lawyers tell us that we would require special legislation to have that go through. We got our $2,000, however, but we are not permitted to use a cent of it for dental repair work, neither can we use it, we are told, for repair work in case of enlarged adenoids or obstructed breathing or hypertrophied tonsils. But we are going to persevere until we can have that work attended to and make our inspections bear more practical fruit than they have in the past.

In our fresh air schoolroom, which we had last year in Brookline for the first time, we put the children in sleeping bags, much as they do in some of the Boston fresh air schools. We feel really a little proud of the success of the school. To have a basis for comparison I weighed each month the children in the fresh air schoolroom, then the children in another room, a closed room, so-called ordinary schoolroom, fairly well ventilated, where the children were of the same age, from the same neighborhood and the same economic conditions at home, and each month we saw the gain in the fresh air schoolroom. The children were not picked out, it was the regular second grade primary in each room, and the comparison was very favorable indeed to the fresh air room children. The teacher, who had broken down in health every year before the end of the summer term, this year, for the first time, went through without a single day's sickness.

ON THE PREPARATION OF ENDO'S MEDIUM.

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Several years ago, one of us (K) began the use of Endo's medium for the isolation of the typhoid bacillus from urine and feces and, it was often observed that the colon bacilli were often inhibited or that they were fewer than was the case in other media used as controls. The media was always prepared in accordance with the directions as given by Klinger[1] and great care was exercised in the neutralization. Yet despite these precautions, the above mentioned facts were often observed. As a media for the isolation of the typhoid bacillus, it is all that could be desired; but was not so good for the colon group when it was desired to know the total number present. It was found after considerable experimentation, that this media could be made as sensitive and as reliable to isolate the colon as the typhoid bacillus. The trouble was due to the variations in the index of alkalinity, which had a considerable range. While this did not seem to effect the growth of the typhoid bacillus, or others of this group, it did the colon group and that the media to give the most satisfactory results must be standarized biologically rather than chemically.

We have been using this media now for the past two years in the examination of milk to determine the colon group content and have found it everything to be desired; in fact it is indispensible.

We therefore wish to briefly describe the methods of preparation and standardization of Endo's media which has given such excellent results.

It is always better to make the media in considerable quantities, say in lots of 6, 8, or 10 liters. The amount of agar can be reduced to 2 per cent. instead of 4 per cent. as originally given.

Peptone, Witte	80 grams.
Meat Extract (Leibigs)	80 grams.
Salt	40 grams.
Agar-agar powdered	160 grams.
Water	8,000 c.c.

Mix the peptone salt and agar with sufficient water to make smooth paste, and then add the balance to make 8,000 c.c. Add the meat extract and, without attempting to mix this, place in an Arnold sterilizer and steam until all is dissolved; this usually requires about an hour.

When it is melted it is then cooled to about 55° C. and titrated to +1 using phenopthalein as an indicator. It is then placed in tall beakers, steamed for an half hour and then allowed to solidify. This is best done by allowing the beakers to remain in the sterilizer over night. In the morning a greater part of the precipitate will have gravitated to the bottom The solidified agar is removed from the breakers, placed on paper and all the precipitate is cut off and discarded. The rest is cut in small portions, replaced in the breakers and melted. It is then allowed to cool down to about 55° C. and standarized in the following manner:

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[1] Klinger, Arbeit, d, Kais. Ges. Amt. 1906 pp. 52.

Eighteen lots of 10 c.c. are placed in an equal number of sterile test tubes and these tubes are divided into two series; one the "acid" and the other the alkaline. To the "acid" series, are added the following amounts of $\frac{N}{\text{HCl}}$, viz: .01, .03, .05, .07, .09, .1 c.c. To the "alkaline" series, the following amounts of a $2\frac{1}{2}$ per cent. solution of sodic carbonate is added, 0, .01, .03, .05, .07, .09, .1, .3, .5, .7, .9, c.c. Then to all these tubes, and while hot add to each 1 c.c. of a 10 per cent. solution of lactose C. P. (crystal) 1 c.c. of a $2\frac{1}{2}$ per cent. solution of sodium sulphite, freshly prepared, and 1 c.c. of a half saturated alcholic solution of basic fuchsin. Pour, then, contents of each tube thus prepared into a sterile petrie dish and allow to harden. The surface of each plate is inoculated with a typhoid and colon bacilli from a 24-hour-old bouillon cultures; one half of the plate streaked with typhoid, and the other with colon. The plates are incubated for 24 hours and the one showing a typical and luxurious growth of both typhoid and colon is selected as a standard for the stock, and the alkali or acid is added to bring the stock to the selected index.

We have found it most convenient for routine examinations to divide the stock media into 100 c.c. lots and employ for this purpose a round bottle holding 120 c.c. which has been marked to 100 c.c. The bottles are filled up to the 100 c.c. mark and then sterilized in the Arnold for an hour for two successive days. It is then stored. When the media is used, it is melted; 1 gram of lactose crystal is added and as soon as dissolved 5 c.c, of a 5 per cent. solution of anhydrous sodium sulphite (freshly prepared and hot) is added and followed by 1 c.c. of a half-saturated alcoholic solution of basic fuchsin. All these are thoroughly mixed when it is ready to pour into plates. For determining the colon content in milk by the direct method, we have found it to be of advantage to employ a petrie dish of 150 m.m. diameter and pour into the plate sufficient of the media to cover the surface and allow this to harden. Then the milk is pipetted directly on the media and just enough of the media is poured in to mix with the milk, so that when it hardens the milk will be held in a thin layer of the media. This procedure will not only prevent spreading, but allows the colon colonies to produce their characteristic reaction within a shorter time than would occur otherwise. In case the media is employed to isolate the typhoid bacillus from dejecta the same procedures are observed as set forth in the original papers. We have found that a 2 per cent. agar answers every purpose and a 4 per cent. agar is not necessary.

METHODS IN EDUCATIONAL HYGIENE.

Oscar Dowling.

President Louisiana State Board of Health, New Orleans, La.

Read before the American Public Health Association, Washington, D. C., September, 1912.

It is conceded that as a nation, we have not valued health as a personal or a national asset. We have been too busy tunnelling mountains, conquering space, boring for wealth, erecting sky-scrapers, piling up vast fortunes to count the cost in terms of human vitality. To make nature in her most forbidding aspect the servant of man has been almost a universal aim. Equally, to control the industrial features of a growing country has been the desire of those ambitious to gain power through wealth. Large ideals—some commendable,—but by no means the highest, when human happiness and human misery are involved..

In the evolution of the national life, this temper of mind was simply the logic of events. Its development was as inevitable as the French Revolution, the Civil War between the states, or any historical incident.

The signs of an awakening to a realization of both the economic and spiritual worth of health is likewise a logical consequence. Intelligent appreciation of the ultimate develops with advancement in other lines and the curve of progress shows that successive ages either have laid the foundations for reforms or built upon an inheritance; not uninterruptedly, but with increasing purpose. "The thoughts of men are widened with the process of the suns," not alone in commercial activities, but, if more slowly, quite as surely, in ethical and spiritual lines of human advancement.

The first stirring for better things hygienic, is due in part to the development of the science of medicine in various aspects and in part to the evolution of a socialized conscience yet in its swaddling clothes.

The first essential in any line of human endeavor is a scientific basis. For work of definite character in hygiene there is at hand a proved body of principles, the long result of time and research. In the promotion of public health this is fundamental. Given this necessary element, it becomes an obligation of civilized intelligence to apply the principles, remedial, preventive and constructive to habits of the people and their standards of health.

In the term Educational Hygiene, the facts and the application are implied. Methods relate to practical means to make concrete the knowledge and bring to the individual and the community a realization of its value. This discussion will be limited to the presentation of conclusions formed in two years of active work.

No educational method is worthy the name which is not founded on psychological principles. Equally, to be effective, it must be adapted to conditions. Psychological principles and adaptability are concomitants, but often in practice the one or the other is lost sight of. Leaders forget that methods must "fit the world" or they are ineffective. It follows "the world" as a factor must be analyzed. As there is toward health, on the part of the masses, a common point of view this is easy.

The public attitude is negative. "Men have died and worms have eaten them" since the world began. It is inevitable. "People die when their time comes." To seek to prevent sickness "is sheer nonsense"; in fact, it is "flying in the face of Providence," it is "unorthodox," it may be "sinful." To lengthen the term of human life and stamp out diseases which have persisted always is only the dream of the faddist and like many other "exploded" so-called scientific theories, well-meaning, but a mistaken and futile effort.

Then if these new-fangled sanitary measures cost less, it might be well to permit experiments. But for the large amounts needed, who can show a return in dollars and cents? If investments are made in reclaiming swamp areas there is the land as an asset, but the draining of large sections as a preventive of malaria is not a "paying" investment.

These few statements crystallize the thoughts of many who come to hear "what the health doctor has to say" and to see (if he happen to have a traveling exhibit) the "new kind of show."

This prevailing impression that nothing can be done to remedy conditions and that "experiments" cost too much is the outcome of ignorance of the science of health and the practical value of these principles. It is a logical state of mind. It is not to be expected that the public should know, or even believe, many of the wonderful truths so recently brought to light.

Therefore, in patience and magnanimity, in the spirit of service, the medical apostle must preach and teach the "Gospel of Health."

As an offset to the feeling of indifference, even of distrust, there is in this country, a receptivity to new ideas, if acceptably presented. In this lies the opportunity.

Conviction that science has put its finger on the cause of many diseases must be brought home to the individual mind; further, that to know the cause is to know the remedy, and that it is to the advantage of all to apply the knowledge, whether it be in the giving of serum or the rehabilitation of a city.

In addition, economic results for money expended must be plain.

It is acknowledged that the public mind is now in the pictorial stage.

The spectacular catches; hence, exhibits, photoplay outfits, working models, pictures, charts, posters, wall cards and illustrated pamphlets are popular. Traveling exhibits in trains, automobiles, on electric trucks and wagons have the advantage of novelty, but they are expensive and adequate equipment in these is impossible.

Exhibits have the advantage of attracting all classes, and, when complete with reference to a specific subject, they are effective.

For example, a collection of models, pictures and charts illustrating principles of oral hygiene shown school children undoubtedly impress and make converts for the toothbrush habit. Differentiated unit exhibits naturally follow those more complete.

Literature written in a popular style is one of the best methods of educating what may be called the newspaper class. But the style must be simple and original. It has been interesting to note the "hit" made by the parody on Mary's Little Lamb.

Methods which recognize the importance of the school as an agency for the dissemination of knowledge and the acceptation of new principles are in the foremost rank of excellence. Pictorial material wisely selected is helpful. Instruction given to children of different grades is most effective if well done.

Psychology indicates that much cannot be accomplished with adults whose habits of thought and action are established. With the young, it is easy to impress principles and induce activity. Discretion is important, however, in the presentation of health facts because of the imagination of the child, the vividness of its impressions and the possible after-effects.

Right here, it is worth while to say that instruction in hygiene in general, is very much below the standard attained in other subjects. The reasons for this are too numerous to discuss. Suffice it to say that text-books on this subject are better than those formerly brought out and that there is a dawning conviction that the teaching should be made practical. However, it is common, even yet, to go into a room with poor ventilation, perhaps, with windows and doors closed and find the teacher giving a lesson in hygiene from a book. Presumably the text has a chapter somewhere on the value and content of pure air, but if read it has not carried home the truth that, of all places, the schoolroom is the one where a generous supply is absolutely necessary.

The facts presented by the school physiology are important, but the elements of hygiene have far more effect in the daily life of the child.

Presentation of practical truths through the eye by illustration and literature and by instruction in the schools are methods which appeal largely to the individual.

Community methods should be identical in principle. One of the best is sanitary inspection. The purview of this division includes the fundamentals of community life, namely, water and food supply, street cleaning, garbage collection and disposal, pollution of streams, sale of drugs, abatement of nuisances and condition of public buildings.

Sanitary inspection, attacking as it does things vital in general welfare, brings an immediate response. For example, an inspection of over four hundred bakeries revealed the fact that one hundred and eighty-seven of the employees needed a bath and clean clothing. One of the men volunteered the information that he had not had a bath nor a change of linen for six days but that that was "scrub night." Reports of the bakeries given to the papers and sent to the proper authorities resulted in a general cleaning. Windows, doors, walls, floors, troughs, trays, were cleaned, and in a few instances screens were installed. Many more satisfactory improvements were made which included rearangements and better facilities, and, for a time at least, cleanliness of employees was made obligatory.

The condemnation of every slaughter-house in a town of 25,000 inhabitants worked a hardship on the people, as cold-storage products, higher in price than home-slaughtered meat, had to be purchased. But the result justified the summary order as one entirely new slaughter-pen was erected and the others brought up to the standard required by the Sanitary Code. It took several weeks; and criticism was not lacking, but the community approved the method.

Inspection of a thousand grocery stores in the rural districts in Louisiana has eliminated from the shelves of these establishments, and others of like type, many harmful patent medicines. Perhaps no feature of the state-wide campaign of 1910 with the health exhibit train was more productive of good than this special effort.

Any improvement, however slight, becomes an object lesson, if nothing more.

The education of the people, always a concomitant of systematic inspection work, is worthy of consideration. Reforms suggested by the health officer are met with apathy, indifference or hostility. The reason is plain. The majority are ignorant of the propagating agencies of disease, even of the danger from careless handling of food products. This ignorance of immediate danger is the basis of hostility. Inspection, touching as it does the supplies needed daily in the home and the necessities of the community, gives opportunity for explicit instruction in the principles of hygiene and exposition of the causal and propagating agencies of disease.

It is a stimulus to activity on the part of individuals and the community.

Medical inspection in the older and established form meant care of contagious and infectious disease with the related problems of public health. While this obtains as a division of all health boards, there is a newer phase, equally as important and more far-reaching in effect, namely, examination of school children.

Two functions are recognized, inspection for the detection of communicable diseases and examination for physical defects. Records from these cities, incomplete and inadequate as they are, show an appalling need for systematized and coöperative efforts on the part of educational and health authorities in this field of endeavor.

In some cities more thorough physical and developmental inspection has been introduced and in a very few the "follow up" system has been inaugurated. The nurses employed are used as social educators. To instruct parents and induce them to avail themselves of medical and dental clinics, if unable to pay for special aid or treatment, are specifically the duties of these trained school nurses.

Modern educational hygiene implies many activities beyond examinations of this character. There is marked need of phychoclinical investigation of abnormal children, the supernormal, and those in different stages of arrested development. There is also need for skilled investigation of the physiologic, anthropologic, sociologic and hereditary problems underlying conditions of mind and body of the various types of children. The biologic requirements of the child in its different periods of development is another phase of this work of investigation and determination. These investigations are full of possibilities and suggestions, not only for the correction of defects, but for the conservation of physical health and mental power.

Inspection, preventive, remedial and constructive, is a potent agency for the application of the principles and the popularization of every practical phase of educational hygiene.

All efforts for the betterment of physical conditions, whether personal or environmental, are constructive, the aim being to substitute the hygienic for the unhygienic, the sanitary for the insanitary.

Health is an individual problem, but it concerns the social unit as well. The larger activities of health work involve the economic and social factors that underlie labor conditions, housing and whatever features of personal or community life make possible inefficiency, lowered vitality or disease. With the removal of these defects fundamental in the social order there would be possibilities for work distinctly constructive which would make for resistance to disease, better physical life and all that is implied. At present this phase of health work is illustrated in the science of eugenics, distinctly constructive in character.

But the day of an established hygienic order of this character is distant. In the meantime the apostle of public health must be content to fit methods to conditions and keep in mind that the world is more and more because a few are vouchsafed the "vision."

Education in the elemental principles of hygiene is the lever which will lift the masses to higher health levels. Methods must embody these primary truths. The appeal will reach only through adaptation to former experiences. The school is the best medium for instruction of the individual, the influence reacting on the home and ultimately on the community.

It is common sense to face the fact that we are yet in the elementary stage in sanitary progress. It is wisdom to attack the essentials, not with the hope of complete immediate regeneration, but with the realization that all reforms pertaining to habits of thought and living are wrought not in a day or in a generation, but slowly through the increasing purpose of the ages.

THE PROLONGATION OF HUMAN LIFE.

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Health Officer, Detroit, Mich.

Read before the American Public Health Association, September, 1912, Washington, D. C.

The title of this paper might lead anyone to think that I am the discoverer of some new serum, which, when injected into the body, will have the marvelous effect of prolonging human life. Such is not the case, however, and it is merely my purpose to call your attention to some things which have much to do with the preservation of health and the prolongation of life. None of the suggestions that I have to make are new, but it is my desire to emphasize the need of putting into practice some of our own teachings. Much has been said in the last year or two in various conventions and meetings of this kind about eugenics, and the subject has been discussed from a great many angles. The teaching of eugenics is a step in the right direction, but the putting into practice of this teaching is the only thing that will bring about satisfactory results. In order to prolong life, then, our first step must be to look after the baby before it is born, so to speak. We must see to it that the parents come from proper ancestry, and that they themselves are fitted mentally and physically to be parents. I have not the time, nor is this the place, to discuss the many ways in which this can be accomplished, but I do want to call attention to one necessary step, and that is a proper marriage law and one that can be enforced, to prevent men and women from entering into the marriage state while they are suffering from any contagious disease. The enforcement of such a law alone would, in many cases, give the child a better start in life than it has today. The best work that is being done for the prevention of infant mortality is the pre-natal work, so-called, which consists, as the name implies, in looking after the baby before birth by giving proper care and attention to the mother. Many other similar steps can be taken besides the two that I have mentioned in the practice of eugenics, all with the same result, that a healthy baby will be born of healthy parents. The next thing in order for the prolongation of human life is to keep the well baby in good health. This is being done in many cities today, and the number is constantly growing. The problem of the prevention of infant mortality is one that is receiving much attention with the result that the deaths in infancy are being very much reduced and lives are daily being prolonged all over this country beyond the first year, before which time many of them have been sacrificed in the past.

Another trying period of life is from infancy to early childhood, say from one to five years of age. During this time many children die of communicable diseases; but the number is not as large as it was formerly because of the efforts of organized Boards of Health in this respect. It seems to me, however, that the education of the public looking towards the prevention of all manner of diseases during this period of life has been somewhat neglected. Boards of Health care for cases of communicable diseases after they have made their appearance and do what they can to restrict the same, but a step in advance would be for health officials to do work similar to that which is being done for the prevention of infant mortality by sending graduate nurses into homes to teach people how to keep their children well after they have gone beyond one year of age. I am very strongly of the opinion that the best public health work can be done through the agency of the trained nurse, and that by using her on every possible occasion for the purpose of educating the public, much can be done toward the prolongation of human life.

After the child becomes of school age, the state takes control of it to to the extent of requiring its attendance at school, and of late years in most places the state is doing its duty in looking after the health of the school child by a supervision of school buildings and a medical inspection of school children with a view of giving them every possible protection. The examination of all school children for physical defects and the correction of the same is an important factor. Especially is this true as it applies to the correction of defective eyesight and hearing, defective teeth and the correction of pathological conditions of the nose and throat. By means of a system of dental inspection done by dentists and a correction of the defects found, either by private dentists, or in the case of indigent children, by publicly paid dentists in dental clinics, probably the most lasting good is accomplished. The general health of the children is improved and they are taught dental hygiene, which teaching remains with them throughout life and aids greatly in preserving their health.

Another thing that should not be overlooked during childhood and adolescence, is the teaching of sex hygiene. It is an open question, and one which I will not at this time attempt to answer, whether this teaching should be given to the pupils in the schools, or whether it should be administered only by the parents. Whatever may be the answer to that question, the fact remains that children should be taught enough of the physiology and hygiene of the sexual organs to understand the question, and they should be told enough of the prevalence and horrors of venereal diseases to aid them in living moral, upright lives. My own opinion is that this can best be accomplished through the parents or possibly through the family physician. There can be no question but that the teaching of hygiene in general, with special stress laid upon personal hygiene, should form part of the curriculum of all schools before the high school grades are reached. Some states have laws with such a requirement, but the courses offered in most instances are not sufficiently thorough and comprehensive. During school age, children should be taught how to live in every respect; they should be taught the value of proper exercise, good nutritious food, pure air and proper habits. An education along these lines will be of better service to our children in after life than a mere superficial understanding of the problem of algebra and higher mathematics.

We have now looked after the child from the time before it was born until it starts out in life and is supposed to look after itself. By looking after one's self most people mean the earning of sufficient money to pay for one's daily bread, but looking after one's self in this discussion should include the protection of one's own health. In other words, all men and women who are self-sustaining, and who are not receiving instruction from their elders in this respect, should learn to value their health as their best asset. To do this, they need the aid of a conscientious and careful physician. It has been my preaching for several years, and I desire to emphasize it now, that every person should submit to a physical examination by a competent physician several times each year. How frequently do men, busy in life with their many affairs, find out by an examination on the part of a medical examiner of some insurance company, that they have a disease of the kidneys. This, like many other pathological conditions, comes on insidiously and does not give the victim any particular warning, but the training and knowledge of the skilled medical practitioner enables him to find out that the disease is approaching before it has had an opportunity to do much harm. It is, therefore, necessary that the examination referred to be complete in every detail, so that the earliest symptoms of any possible disease may be detected, and the disease process arrested at once. It is up to the doctors, it seems to me, to bring about this practice of preventive medicine among the people, and it is certainly up to the members of this Association. Most mothers have learned to call in a physician to tell them how to keep their babies well before the babies become diseased, and to some extent they are pursuing the same tactics as applied to their older children, but they themselves assume that they are well so long as they are able to be about and attend to their many duties. Why should not the mother and father demand the same attention for themselves that they are asking for their children? Incipient Bright's disease can be arrested and life prolonged by attention to a proper diet and mode of life. The same can be said of diabetes, and we know, if we know anything in medicine, that tuberculosis in its incipient stage, at a time when it is not recognized by the victim, is a curable disease; at least curable to the extent that the pathological process can be arrested, and the patient's life indefinitely prolonged as far as this disease is concerned. There are many other conditions, which, if allowed to go on without attention to the rules of personal hygiene, will become worse and end in early death, whereas they may be to some extent corrected, and to a great extent arrested, if proper attention is given them.

There can be no question but that Boards of Health and sanitarians everywhere are trying to awaken the public to the facts which I have enumerated, but in order to make their work more effective, they should have the assistance of the medical profession as a whole, and particularly of those members who are not directly connected with public health work. If the family physician of all the people will teach them the good to be obtained by their practising personal hygiene, it will not be long before the scope of human life will be considerably prolonged.

EDUCATIONAL PUBLICITY IN OFFENSE AND DEFENSE.

Hoyt E. Dearholt, M. D.

Executive Secretary, Wisconsin Anti-Tuberculosis Association, Milwaukee, Wis.

Read before the American Public Health Association, Washington, D. C., September, 1912.

Supply and Demand.

There are 92,000,000 people in the United States consciously or unconsciously struggling for the best obtainable health and the longest possible lives.

Science has determined the cause of nearly all communicable diseases and demonstrated that they are preventable. And communicable diseases are *not* prevented to any great extent and there is manifest no remarkable lessening in the death rate. That is a reasonably accurate presentation of the public health situation in this country today, is it not?

On the one hand, there is a demand for life and health assuring facilities equal to and exceeding the visible supply. On the other hand, the visible supply is not being utilized to any great extent, and the storehouses are full to overflowing. That is likewise sufficiently accurate to serve as a simile, is it not?

If one were to lay the above situation before a successful merchant in terms of his own experience, and ask him what was wrong, he would undoubtedly snap out the queries,—"Have you advertised? If so, have you done it well? Is your shop well located and are your windows attractively arranged? Are your salesmen and saleswomen courteous, and are they doing all they can to help the purchasing public to get what is actually wanted, however it may be asked for?" By the time one had answered those questions honestly and frankly, a clearer picture in a little more detail of the public health situation would have been set forth.

A manufacturer similarly approached would desire to know if the product was honestly good, and the price consistent with the actual worth. Satisfied that good judgment was used in the purchase of raw materials, that skilled workmen were engaged in their fabrication, and that there was no extravagance in the factory management, he, like the merchant, would turn to an analysis of the sales organization.

Supplying the Demand.

The sales organization, in the sense that the term is used here, is the force which operates between the producer and the consumer; that popularizes the product, stimulates interest, desire and demand, and actually negotiates the transfer.

However exalted the parentage may be held to be, sanitation is a useful art and an applied science, honorable and honored in direct proportion to the extent it is utilized and practically applied.

The sooner sanitarians come to a full appreciation of the fact that public health is a utility, and to a frank admission or boast (if you please) that it is their function to create a purposeful demand and to supply a useful and, therefore, valuable product, the sooner will that honor and respect, which is essential to the prosperity and success of the project, be given by the pulic.

In whatever respect we may hold the inventive genius of Edison, a very superficial study of the power of this remarkable man will demonstrate that his ability to popularize his conceptions and inventions has been of infinitely more importance in the development and progress of his work than have been the conceptions themselves. Without the patronage of the public, the phonograph (to choose one of the inventions, for example) would remain more or less a crude, scientific laboratory curiosity, instead of a well-nigh mechanically perfect and easily accessible source of much enjoyment, culture and education.

The development and practically universal application of the moving picture apparatus has called for a higher degree of sales organization. It serves to illustrate a more complex coöperation and coördination, made necessary by inherent complications in the problem of bringing producer and consumer or patron together.

The thousands upon thousands of miles of expensive copper wire, the remarkably perfected instruments, the costly buildings and the millions of dollars worth of stock certificates and bonds, offer visible and palpable evidence of the people's willingness and eagerness to finance and utilize such a conception as was represented by Alexander Bell's original crude, cumberous and troublesome exposition of a telephone.

Pasteur's Proposed Enterprise.

And what has come to the infinitely more marvelous, infinitely more beautiful, infinitely more useful, conception of Pasteur,—the conception that "it is within the power of man to cause all germ diseases to disappear from the earth?"

Isn't it perfectly patent, that it has, in a measure at least, gone the way of many great inventions,—that it has been, for a time, under the cloud of bad business management? When a business or an industrial enterprise is found to be out of balance, when operation ceases or fails to be as profitable as faith dictated it should be, it is customary to take stock, to balance debits and credits, in short to call in a business doctor, if home diagnosis and home remedies fail to bring about the improvement that prevents or postpones the funeral service in the bankruptcy court.

If there is any serious internal disorder in public health administration it must be removed or corrected before our enterprise will go far or fast. It is, however, with the externals, the front that is turned to the public, that I have chosen to confine the discussion of this paper, believing, even, that a healthy, sound, substantial interior must be present or acquired to permit of a lasting good appearance.

Promotion.

For the welfare of the enterprise, let us, as rapidly as possible, throw affectation into the scrap heap,—let us do away with the terms "love of humanity," "good of mankind," "disinterestedness," etc., and make a frank avowal to the public that we are promoting a business for providing better health and longer lives; that we are going to make that business grow to be as big and as profitable as possible; and that as success comes we shall expect a fair wage for the efficient management. Instead of breeding criticism and suspicion, this will, in great measure, allay that which is already present and common enough.

Financing.

Capital will be furnished in proportion to the degree in which the promotion is well or poorly conducted. It must be borne in mind, and due allowance made therefor, that the investing public (in this instance, the taxpayers and their financial agents and directors: legislatures, county, city and village boards) has, in the past, made many unprofitable investments and is right to be sceptical.

Operation.

By adjusting scope to capital, and by employment of that initiative, ingenuity and resourcefulness which characterize the building of successful enterprises of any character, accomplishment, however modest, so long as it is proportionate to outlay and operating expense, will insure further capital.

Sanitation has passed the experimental stage. Wood in Cuba and Gorgas in Panama, and a few sanitarians in the United States, have demonstrated practical operation and enormous dividends. With slight modification and adaptation to local conditions and needs, their success can be duplicated in every commonwealth, city, village and township in the country.

Insuring Confidence.

After the enterprise is launched or reorganized, it is to be expected that development will, for a time, consume or warrant the postponement of dividend payments. Obviously, the stockholders will be eager to know that their investment is safe, that their hope for profit has not been another phantom dream of avarice.

The success of the enterprise, at this time, hangs in the balance. Proper publicity, correct explanation, the creation of comprehensive understanding, will insure confidence and stability. Expansion and extension from this time will be entirely a matter of mathematics and capacity.

While a mistake is commonly made in trusting too little in the interest and intelligence of the public, there is also danger in trusting too much. The truth is, that while there is no stronger instinct than the love of life and health, there is, in the helter-skelter life of today, no end of divertisements. And this is where the science and art of exciting and maintaining the interest and support of the public holds the balance of power.

Publicity Media Analyzed.

The oldest form of advertisement is by word of mouth, which is expressed today by lectures, personal argument and boast. The next is by symbolic and pictorial representation, survivals of which are still to be seen at some inns, livery stables and all barber shops. It was the discovery of the art of printing which gave knowledge, information and curiosity a new meaning and boundless opportunities.

The best means of popularizing the health movement are afforded by the lecture, the exhibit, pamphlets and booklets and the daily press. The best results will be obtained by a judicious and balanced employment of all of them. The technique of their employment is best acquired by a critical analysis of the advertising methods of the most successful, privately owned business institutions. In an enterprise of any considerable magnitude, there will be opportunity for the exercise of the entire time and best effort of an expert or a corps of experts.

If time and your patience permitted, I should like to exhibit good and bad examples of public health publicity, for the positive and negative suggestions they offer. Instead, a comment or two on the more important publicity media must suffice.

The Press.

This is an age of tremendous competition in spite of anything the "Trust busters" may tell us. Nowhere does this competition manifest itself more pointedly than in the struggle of "news" to pass the editorial blue pencil or waste paper basket.

A worthy cause alone is not enough to secure and control a sufficient amount of valuable newspaper space to popularize and materialize a sanitary Utopia. While newspaper editors have displayed a most generous and patient toleration, there must come a time when they will refuse to longer jeopardize the paper's reputation for enterprise by publishing inspired but tedious, prosy and amateurish essays.

Etymology justifies the editor's contention that the newspaper's function consists in printing "recent intelligence of something that has taken place." The sense of public responsibility possessed by nearly every editor, however, makes easily possible his connivance in the publication of old facts needing frequent expression if—mind the "if"—they are put under the guise of news and in a "style" which is in accord with the general make-up of the newspaper.

Between the hours of 2.30 a. m. and 2.33 a. m., the style of the medical society essayist or of the contributor to the *Atlantic Monthly* does not excite the enthusiasm of a nervous, overwrought headline writer and impel him to dig the salient catch line out of a paragraph somewhere toward the end of the article and transpose it into eighteen letters and spaces at the head of a column.

The editor gladly pays for interesting and suitable "stories," suitable and suited to what his experience and judgment lead him to believe his readers want. He will pay the competent public health educator well in generous space, good positions and unsolicited editorial comment, for the real service and the real assistance that will shorten his daily grind of "copy."

The Exhibit.

For elementary instruction, exhibits take the place in public health education that alphabet blocks and the more advanced Froebel and Montessori methods do in the mental training of the young. They entertain and instruct. The more ingeniously devised they are, the more they will prove to be both instructive and entertaining.

Cartoons and Graphs.

The Cruikshanks, Nasts and McCutcheons have undoubtedly left as deep an impress upon history as have the Wessleys, Phillips and La Follettes.

Keen, well-conceived and cunningly devised cartoons on evil sanitary conditions, particularly when pointedly coutrasted with more or less beatified and rose-tinted sunshine pictures, are calculated to sink into the consciousness and mould the habits and taste of the public for which they are calculated.

It isn't the art or the draughtsmanship which carries the cartoon. On the contrary,—correct detail and too nice a sense of exactness will frequently mask or distort the fundamental image.

Leaflets and Reports.

There may be a place for somber faced, listless, illy composed, smudgilly printed reports and public health preachments. With the great mass of other recipients, I'm impelled to say that it is in the waste paper basket. The pity is that so many efficiency purchasing dollars should be invested in scrap paper.

When one's mail contains beautifully illustrated, attractively printed, insinuating literature on breakfast foods, silk stockings, irrigated orchard projects, and 100 per cent. dividend investment prospects,—who is it that is expected to extract a possible interesting fact out of the typical health board publication?

A well-edited, mechanically clean, smooth running, four-page pamphlet will do more purposeful work than a volume of flat statistical tables stitched inside a shroudlike cover.

The Lecturer.

The lecturer, like the newspaper correspondent and the pamphleteer, must be prepared to engage and overcome uncompromising competition. Nowhere is technique, originality and resourcefulness put to a more severe test. This is undoubtedly the most costly form of winning the attention and coöperation of the public. When this is considered, the expenditure of a few extra dollars and sufficient time to attract sizable audiences and good press reports for the "stay-at-homes," is not alone warranted but imperatively demanded.

Conclusion.

In conclusion, let me say that, while in publicity, as in any other technical work, inordinate self-interest and vanity may for a time pass counterfeit, sooner or later a trial balance of quickly convertible assets and unavoidable liabilities must be struck.

Taking the public into full partnership in the public health enterprise offers tremendous opportunity to the strong man in the health office. The other kind will do well to lie low and attract as little attention to himself and his work as is possible.

MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH.

Abstract of Proceedings. Quarterly Meeting.

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, Tuesday, October 29, 1912, Dr. Samuel H. Durgin, Vice-President, presiding.

On the recommendation of the Executive Committee the following new members were elected:

Dr. John S. Carroll, Lowell Board of Health.
Prof. Selskar M. Gunn, Massachusetts Institute of Technology.
Thomas J. Donnellon, Boston Board of Health.
W. A. Bense, Canton Board of Health.
Samuel Myer Schmidt, Boston Board of Health.

Reports of Committees.

Doctor Slack presented the following report:

Report of Committee appointed at April Meeting to consider the question of proper regulations concerning the leaving of milk at homes where there are infectious diseases.

It is the opinion of the committee that the rules now in force for the care of milk bottles at homes where infectious diseases exist are insufficient for the following reasons:

1. Where vessels are set out at the customer's door they are liable to contamination from dust and from animals, and the removal of caps from bottles by drivers is also liable to contaminate the milk.

2. Families often do not comply with the notification of the Board of Health to set out receptacles, and in such cases the milkman is apt to leave bottles, contrary to the board's regulation, since if he does not do this he loses his customer.

3. The burden of enforcing the ruling is thus placed upon the milk dealer, who often does not enforce same on account of causing offense to customers.

4. There is no provision in the present rule for controlling bottled milk bought from stores.

The following regulations are recommended:

1. That Boards of Health permit the delivery of milk in bottles to houses in which infectious diseases may exist.

2. That milk dealers as at present be informed of the presence of disease.

3. That a special notice to milkmen be posted at the milk-service doors of houses informing the milkman of the presence of disease, and

ordering him to remove no bottles from said location until the removal of the card.

4. That the medical inspector or visitor from the Health Department give instructions to householders to keep all milk bottles brought into the house until the case is discharged by the Board of Health. Such bottles to be properly cleansed and stored until released by order of the board.

5. Upon release of infected premises from quarantine, inspectors of the Board of Health shall cause all milk bottles to be disinfected before returning to the dealer.

6. That a penalty be attached for any person found violating these regulations.

F. H. Slack, *Chairman.*
Charles K. Whiting.
Sumner T. Coolidge.
W. P. Coues.
George E. Bolling.

(On motion, the report was accepted and placed on file.)

Mr. Bolling presented the following report for the Legislative Committee:

Report of Legislative Committee.

The Legislative Committee wish to report that they are in favor of introducing a bill at the next session of the Legislature calling for the establishing of a standard for cleanliness in milk intended for sale.

For a great many years we have had on the statute books of Massachusetts a law fixing a standard of milk as regards the amount of solids and butter fat it must contain. This law did not specify that a man must keep so many Jerseys, so many Guernseys, so many Holsteins, and so many brindle cows in his herd in order to reach a certain standard, it simply fixed a standard and told the producer to get milk that would reach it. So there is a growing feeling that as regards the production of clean milk a voluminous law treating with specious detail is unnecessary, but what is needed is the establishing of a definite standard of cleanliness.

The following is a draft of a bill which must be regarded as tentative only as changes may be made before it is submitted to the Legislature:

Sect. 1. No person, by himself, or by his servant or agent, or as the servant or agent of any other person, firm or corporation, shall sell, exchange or deliver, or have in his custody or possession with intent to sell, exchange or deliver, any milk which contains more than 500,000 bacteria per cubic centimeter or any pathogenic organism.

Sect. 2. For the purposes of this act the number of bacteria in milk shall be deemed proportionate to the number of colonies developing when one cubic centimeter of the milk diluted 10,000 times with sterile water is placed in a Petri dish of 9 to 10 centimeters inside diameter with nutrient agar of 1.5 per cent. acidity and incubated for 48 hours at 98.6° Fahrenheit.

SECT. 3. For the purposes of this act samples of milk may be taken by such officials as are authorized by existing law.

SECT. 4. Any one violating Section 1 shall be notified of the offense and if three consecutive samples, taken at intervals of not less than 3 days be found to contain bacteria in excess of 500,000 per cubic centimeter he shall be subject to a penalty of not more than fifty dollars.

SECT. 5. It shall be the duty of officials enforcing this act to inform any person violating the same of means that may properly be taken to diminish the number of bacteria in milk.

GEORGE E. BOLLING, *Chairman.*

(On motion, the report was accepted and placed on file.)

Papers Presented.

The following papers were then read:—

Housing Problems, by Thomas Jordan, Boston.

Some Practical Considerations on the Presence of Leucocytes and Streptococci in Milk, by James J. Scannell, M. D., Boston.

Medical Inspection of Schools, by Robert W. Hastings, M. D., A. M., Brookline.

(These papers are printed elsewhere in this number.)

Further Business.

It was moved and seconded that the Association go on record as endorsing the bills suggested by Mr. Jordan in his paper, and urge upon the Legislature of 1913 their passage. The motion was carried.

It was moved and seconded that the Legislative Committee be directed to introduce such a bill as they have reported at the next session of the Legislature in regard to establishing a standard for cleanliness of milk. The motion was carried.

BOOK REVIEWS.

Infantile Mortality. *Report of the Special Committee appointed by the Council of the Royal Statistical Society to enquire into the systems adopted in different countries for the registration of births (including stillbirths) and deaths with reference to infantile mortality. London: Royal Statistical Society. 1912. Price one shilling. Pp. 61.*

This report is of timely interest, especially for the United States where much attention has been devoted of late to the question of obtaining adequate registration of vital statistics. Knowledge of infantile mortality is of fundamental importance in public health work and the recently organized Children's Bureau of the Federal Government is given the task of making special studies of infant mortality and birth registration in this country, although, to our disgrace, there is scarcely a state or city in the United States in which fully dependable figures for births or infantile mortality are available for any extended series of years.

The value of the investigation undertaken by the Royal Statistical Society is assured by the constitution of the special committee, which was composed of Dr. Reginald Dudfield (chairman), Sir William Cospatrick Dunbar, Sir Shirley F. Murphy, Mr. C. P. Sanger, and Dr. T. H. C. Stevenson. It was found necessary to extend the original scope so that it "practically covers the whole system of registration and the calculation of vital statistics." A questionnaire was sent to 133 registration officers in various countries, states and provinces, and replies were received from 103. The information received requires to be supplemented by data from official publications, and the particulars relating to certain states of this country are not in all instances correct;[1] nevertheless, the report as a whole is well worth careful study by all interested in the adoption of better methods of collecting and compiling vital statistics.

A brief sketch is given of the history of registration, followed by a discussion of the practice of registration in general, stillbirths, and statistical methods. "Registration" is divided into two acts, "declaration" and "inscription." No special study was made with respect to the responsibility for declarations, but the prevailing practice is that of England in which the primary duty is placed upon the father and mother of the child, for births, and upon the nearest relative, for deaths. In the United States the medical practitioner or midwife is required to report births, a practice which "assimilates closely to that under the Notification of Births Act," and the undertaker is primarily responsible for the filing of the certificate of death.

Under efficiency of registration, it is stated that "the answers dealing with this subject, convey, with comparatively few exceptions, opinions that registration is very fairly complete—in the more settled countries at least. Registration of births is, perhaps, on the whole less complete than that of deaths, and that such should be the case is probable from the apparent lack of facilities for tracing births. Registration of births is admittedly incomplete in the majority of the individual states of the United States of America. Further, registration both of births and deaths is incomplete in countries having a colored population (*cf.* India, Orange Free State, etc.)." In the table in which the replies to the question "Do many births or deaths escape registration!" are presented, the replies for the United States do not appear very creditable in contrast to the definite negative or very slight margin of incompleteness presented by foreign offices. California answers "A few," with a note that "Hardly any deaths escape registration, but birth registration is probably incomplete, especially in unsettled or sparsely settled rural districts." The District of Columbia admits a deficiency of 5–10 per cent. of births; Connecticut, "about 10 per cent.;" Maine, 10–15 per cent.; Maryland, 40 per cent.; Massachusetts, "a few;" Michigan, "not many;" New Jersey, 0–20 per cent.; New York, 0–10 per cent.; North Carolina, "We think not;" Texas, 45 per cent.; Rhode Island, "not many;" Wisconsin, 10 per cent. The reply from North Carolina must have been under misapprehension, as the state has no law whatever for births and that for deaths at present applies only to municipalities of 500 population and over, in some of which the registration is incomplete. Not much dependence can be placed upon percentage estimates of efficiency, a very usual estimate being "90 per cent." even in the case of grossly incomplete returns.

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[1] As an example of the difficulty of ascertaining the precise conditions, it is stated in Table E (p. 50) under the head "What data are used for calculating birth and death rates?" that seventeen out of the nineteen American states replying to the question employ the "Numbers registered." This is contrary to the Rule of Statistical Practice adopted by American registration officials, "Total deaths should include all deaths that occurred in the given area during the period stated in the table, and no others." The question that elicited the information was: "In compiling statistics of births, stillbirths and deaths for any period, do the births, etc., relate to the numbers occurring, or to the numbers registered during that period?" Upon inquiry, it appears that the reply "Numbers registered" merely meant, in the great majority of cases, that the compilation was based upon births and deaths returned as the results of registration, in distinction from estimates of the numbers that may have occurred and, in part, have escaped registration, and that the births and deaths compiled in the report for a given year were those that actually occurrred during the year, not the number registered or reported during the year. Weekly or monthly bulletins may relate to "deaths reported" or "births reported." but not annual reports as a rule.

Confusion is introduced into the statistics of infantile mortality by the varying methods of different countries with respect to the definition of stillbirths. In Belgium, France, Holland, and Spain the "stillbirths" include a proportion of children born alive but dying before registration. "It does not appear to be very material," in the opinion of the committee, "what registers are used, so long as statistical tabulation is uniform," and the following conclusions are presented:

(1) That it is desirable that an international definition of "stillbirth" should be adopted;

(2) That stillbirths should be registered; and

(3) That where the definition of "stillbirths" does not exclude from such category the births of children born alive but dying before registration, official inquiries should be instituted on the occasion of registration with a view to discriminating between such forms of pseudo stillbirth (Bertillon's *dit mort-né*) and the genuine (*mort-né*).

The Chairman also presents, as a base for future discussion, the following definitions of "stillbirth" and "stillborn:"

"A stillborn" child means a child born after a period of gestation of not less than seven lunar months (28 weeks) whose heart has ceased to function before the whole of the body (including the head and limbs) of such child has been completely extruded from the body of the mother; and

A "stillbirth" means the birth of a stillborn child.

The committee lays stress on the usual definition of infantile mortality as the "ratio of deaths during the first year of life to births" and feels that the method, employed in a few countries, in which the estimated number living at ages under one year replaces the births is "most unsatisfactory and even illusory." It concludes with the following recommendations:

(1) That stillbirths should be tabulated separately, such tabulation to include, *if necessary*,

(*a*) the number of children born alive but registered as dead, and

(*b*) the numbers born in each successive week or month after the prescribed (earliest) time for registerable stillbirths;

(2) That for general use the infantile mortality rate should be calculated from

(*a*) the births of children born alive, including, *if necessary*, those born alive but registered dead, and

(*b*) the number of deaths of children born alive during the first year of life, including, *if necessary*, the children "presented dead."

This question of the definition and statistical treatment of stillbirths, which is necessary to secure uniformity in the statement of living births and of deaths, has been considered carefully by American registration officials as shown by the proposed resolutions printed in the *Quarterly Publications* of the American Statistical Association, December, 1907. Among the resolutions adopted by the American Public Health Association, at Winnipeg, 1908, as Rules of Statistical Practice[1] were the following:

> *Rule No. 18.*—Birth (completion of birth) is the instant of complete separation of the entire body (not body in the restricted sense of trunk, but the entire organism, including head, trunk, and limbs) of the child from the body of the mother. The umbilical cord need not be cut or the placenta detached in order to constitute complete birth for registration purposes. A child dead or dying a moment before the instant of birth is a stillbirth, and one dying a moment, no matter how brief, *after* birth, was a living child, and should not be registered as a stillbirth.
>
> *Rule No. 19.*—No child that shows any evidence of life after birth should be registered as a stillbirth.
>
> *Rule No. 20.*—Stillbirths should not be included in tables of births or in tables of deaths. They should be given in separate tables of stillbirths.

These rules have been insisted upon by the Bureau of the Census in its instructions to state and city registrars for the return of births and deaths, and may be found in the Manual of the International List of Causes of Death which is used by them as a guide for statistical compilation. At the recent meeting of the American Public Health Association at Washington, September, 1912, it was proposed to give additional precision to them and to define the lower limit of uterogestation, below which stillbirths need not be registered. A special committee was appointed, the chairman of which is Dr. Charles V. Chapin of Providence, to report at the next meeting.

It is very gratifying that the rules adopted by American registration officials and the recommendations of the English committee are so closely in agreement, and it is to be hoped that international statistical practice will conform to the suggestions for a uniform and precise statement of stillbirths, by means of which some of the present difficulties in making exact comparisons of infantile mortality will be obviated. It is, of course, most important that stillbirths should be registered and studied on their own account, and it is surely time that Great Britain and the British colonies, in which for the most part stillbirths are entirely ignored for registration purposes although they are reported in England and Wales under the Notification of Births Act, should take steps to bring up their statistics in this respect to a level with those of other countries.

Cressy L. Wilbur.

Nutritional Physiology. *By Percy G. Stiles, Assistant Professor of Physiology in Simmons College; Instructor in Physiology and Personal Hygiene in the Massachusetts Institute of Technology, Boston. 12mo of 271 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1912. Cloth, $1.25 net.*

Stiles' new book is a concise treatment of the chief divisions of human physiology from the steadfast standpoint of nutrition—of energy transformation. It is not a compendium of tables of calorific food values and practical dietetics for old and young.

Digestion and nutrition, *per se*, naturally constitute the bulk of the book—about two thirds. The remaining third is devoted to the other departments of physiology, the nervous system and muscles and glands preponderating, while a chapter apiece is given to temperature regulation, internal secretion, and alcohol. Obviously an admirably balanced distribution in view of the author's stated aim and plan. Special mention should be made of the Alcohol chapter as a classic—a model of sound, impartial treatment.

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[1] See Census Bulletin No. 108, Mortality Statistics, 1909.

The form of presentation puts the book in a class of limited membership. The author appears to be master of a style of fine simplicity which interposes no screen of muddy language between the reader and the subject-matter. Difficult points are revealed by forceful and ofttimes quaint similes from common experience, but great care is taken to point out the limitations and possible weakness of each analogy.

The subject-matter appears to be scrupulously precise and up-to-date. The unusual combination of soundness and clarity makes the book useful for layman and scientist and particularly for students in elementary physiology and household economics.

It is difficult to criticise unfavorably on such a delightfully *rara avis* in scientific presentation. But in the reviewer's opinion one of its faults lies in one of its claims to virtue—the use of illuminating analogies. The student, ofttimes, is relieved of the necessity of overcoming any obstacles whatsoever. The reduction of needed mental effort to a minimum is not an unmixed blessing from the point of view of developing the student's powers.

Eugene C. Howe, Department of Hygiene and Physical Education, Wellesley College.

"Fresh Air and How to Use It." *by Thomas Spees Carrington, M.D., New York, The National Association for the Study and Prevention of Tuberculosis, 105 East 22d Street; 250 pp.; 150 illustrations; cloth; price, $1.00 postpaid.*

The right kind of a book comes to the public at the right time. Doctor Carrington has produced such. People in cities, in villages and in summer resorts are appreciating fresh air, outdoor sleeping and living and are inquiring; their first inquiry is as to how it may be made available in their different localities. On the Shawangunk Mountains of Ulster County may be seen numerous sleeping loggia like the pictures on pages 186 and following. The illustration on pages 121 and 204 show three of the seven open air balconies in one block in New York City.

Doctor Carrington's book is of special value in showing how odd corners may be made available for balconies. It is also valuable in the details of dress and management of cases unaccustomed to living outdoors and wishing to learn the safe method.

Doctor Carrington knows his subject and has written clearly and fully, besides he has amply illustrated the text by the use of well-selected photographs.

Inquirers may look to this book with the assurance that it will answer all questions.

W. P. Northrup.

The Prevention of Destitution. *By Sidney and Beatrice Webb. pp. 348. Longmans, Green and Co., 39 Paternoster Row, London. New York, 1912. $2.00.*

The Prevention of Destitution, which is the summarization and popular presentation of the minority report of the Royal Commission on the English Poor Law, is a book which deals with public health problems in the deepest and broadest social sense, and from that standpoint should command serious study on the part of all those interested in constructive and preventive health measures. The book emphasizes the more modern public health idea: that conception which reaches beyond exact science and the laboratory, and includes in its scope social and industrial reconstruction, educational and philanthropic efforts for human betterment, and all attempts at economic readjustment.

However much one may differ with the Webbs as to the significance of destitution in its causative relation to public ill-health, everyone will be forced to admit that it is an important factor. The first chapter, which defines destitution as "the condition of being without one or other of the necessities of life, in such a way that health and strength, and even vitality, are so impaired as to eventually imperil life itself," further treats it as a disease of society. The etiological factors in this social disease may be sickness or invalidity, death of a breadwinner in a family, old age, imbecility, incapacity, unwillingness, etc. In a chapter which deals with sickness and destitution the point of view is one of prevention, emphasis being laid on methods of attacking disease in its most incipient stage, on an improved public health service, on better sanitation, and on the utilization of all preventive measures, such as milk dispensaries, instruction of mothers and health visiting.

In a portion of the book devoted to human breeding there is discussed the relationship of eugenics to public health. Mr. Webb seems to belong to that wing of the still unorganized army of eugenists, where environment and training are considered of greater importance than any hereditary possibilities. He says: "We can alter the anti-eugenic breeding only by changing the environment which is responsible for it." He refutes that belated type of mind clamoring for the survival of the fit by the reminder that "where the rules of the ring favor a low type, the low type will survive."

Perhaps the most convincing chapter, least open to criticism, is the one on "Child-neglect." In an imaginary review before the king he depicts in striking terms the great national parade, made up largely of fairly healthy young men and women, but presenting, besides, a far too large proportion of anæmic, flat-chested, physically defective youths, cripples, blind, tuberculous, syphilitic, and criminals. A few of these are no doubt the result of evil inheritance, but most of the failures at twenty-one are made into failures either by neglect during the school years between five and fourteen, or by poverty and maladjustment after leaving school. The remedy lies, in part at least, in the further development of medical school inspection, of continuation evening schools, the latter not only for the better preparation it would provide the young for their entrance into the life struggle and the advantage that would result from some degree of state supervision at this period in their lives, but also for the increased opportunity it would give for the readjustment economically of unemployed adults.

The broad scope of the book is indicated by the space given to overwork or "sweating," underemployment and unemployment, and the effect of these agencies on social well-being. Mr. Webb points out that part of the population is earning barely sufficient to sustain existence; working hours of labor such as to make the lives of the workers periods of almost ceaseless toil; and under sanitary conditions injurious to the health of the persons employed, and dangerous to the public. Aside from the social and moral perversion of justice which this represents, it is from the narrowest standpoint of wealth production inconceivably short sighted. On the other hand, society is confronted with the great mass of underemployed or unemployed. Webb's analysis of the causative factors in this problem and the presentation of the remedial measures recommended are examples of keen social analysis and of socially constructive statesmanship.

The question of state insurance occupies more than sixty pages of the book. It is in this chapter that Webb takes a more critical and antagonistic attitude than elsewhere and it is here that many readers will be inclined to disagree with the author. His sweeping statement that insurance does not prevent is surely too broad for justification. Insurance, under a rational method of application, surrounded by the necessary safeguards, is undoubtably a preventive of much poverty and destitution. It is true, however, that sickness insurance is apt to be vicious, without an efficient public health service, and unemployment insurance may lead to imposition and pauperization unless associated with publicity bureaus and well-organized labor exchanges.

The chapter on "Voluntary Agencies" is an illuminating discussion of the advantages and disadvantages of voluntary charity. Perhaps the most positive and genuinely constructive part of the book is the section presenting the necessity for a new public officer, the "Registrar of Public Assistance." Finally, in the chapter on "The Moral Factor," Mr. Webb shows the magnificent spirit of the book, and of the author. He is one of those who believe that our evils are social ones, arising from maladjustment. He places prevention before relief, and the principles he advocates are curative, not palliative. He is pragmatic, somewhat of an opportunist, and perhaps worthy of the criticism so long directed at him and his earlier fabian associates. He may be considered by some a "Gawdsaker," which term H. G. Wells applies to those who constantly rush about exclaiming: "For gawd's sake let's do something." However, the emphasis he lays on education would indicate his belief that the comprehension of principles must precede a ceaseless activity. He recognizes the necessity for a community sense of direction, the awakening of a social consciousness, and a collective social and moral responsibility.

Donald B. Armstrong.

Ventilation from a new Stand-point.

British physiologists have devoted a large share of their energy in recent years to the problems connected with respiration. Leonard Hill is perhaps the most prominent of a group whose names are associated with fruitful studies in this field. It is therefore interesting to consider a summary of his views concerning ventilation. Such a statement in a condensed and popular form he has embodied in a presidential address before an English association and it has been reprinted by *The Popular Science Monthly.*[1]

The article reads like a stenographer's report and various slips of the tongue—or instances of careless proofreading—appear in it. These can be overlooked; though a New Englander resents the obvious confusing of the intellectual Laura Bridgman with the hapless defective known in physiological literature as "Strümpell's patient." The really important matter of the address can be divided into two parts—first, a review of the doctrines previously held and of the transition to current beliefs and, second, the considerations which are more distinctly the speaker's own.

The readers of this Journal are so familiar with prevailing views that only the briefest statement need be made. It has been established that lack of oxygen is practically unknown under the worst conditions of crowding and restricted air-supply, so long as we are observing subjects at the sea-level or at ordinary attitudes above it. Hill points out effectively that in the most intolerable situations in shops, mines, or tenements the oxygen supply is more liberal than in the celebrated health resorts of the Alps. Increase of carbon dioxide to the percentage which clearly disturbs the human system is only the remotest possibility. In the light of these facts men of science turned for a time to the hypothesis of "crowd-poison" to account for the untoward effects of deficient ventilation. It was maintained that organic exhalations from the respiratory tract, the mouth, the skin, and the clothing must accumulate in the stagnant air.

Crowd-poison still has its protagonists but can be said, on the whole, to be in disrepute. Hill makes light of it. He recognizes, of course, that an odor in a stuffy room must have a chemical basis but he points out that such odors cease to be apparent to persons who continue to breathe the vitiated atmosphere. The assumption is made that the sensation completely measures the influence of the odorous material on the organism. This appears to the reviewer to be utterly unsafe. Crile has abundantly proved that central anaesthesia does not insure the neutralization of the effects of stimulation through afferent paths.

Hill fully endorses the teaching to which we have become accustomed that there are but two qualities in the air of ill ventilated places that are at all likely to make themselves felt, high temperature and high humidity. In fact, it might be claimed that only one of these, high temperature, need be considered. For high humidity is not significant in connection with moderate temperatures. Lack of movement in the air might be mentioned as another detrimental condition but this is really tributary to the two just mentioned. If there are no currents the air next the skin of the face and hands is not briskly exchanged for fresh portions and it becomes warm and moist. Hence, the surface of the skin would be as warm in a room filled with still air of a certain temperature as it would in another room where the mercury was standing several degrees higher but with the air in circulation. Hill is an advocate of the electric fan.

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[1] Vol. LXXXI, October 1912, pp. 374–396.

But we must pass to the more novel parts of the address. The speaker tells us that when the ideal of the architect and the engineer is attained—the older standards being sought—the result is far from satisfactory. The air of the work-room of the school is chemically correct, its temperature is 68° F., there are no draughts,—but the occupants are sluggish and depressed. Very likely they complain of the ventilating system. The cause of their dissatisfaction is, in a word, that the environment is *unstimulating*. We have been so anxious to eliminate disturbing factors that we have produced an unwholesome calm. The human body is not accustomed to the suspension of external stimulation; it has been developed under such spurring and tends to lose tone and efficiency when shielded from it.

If we analyze the effect of the absence of stimulation we shall probably be safe in concluding that one result is a vascular relaxation, presumably with some decline of the arterial pressure. Another is a softening of the musculature. Both these changes are such as favor mental passivity and scattering. They are characteristic of the approach to sleep. When we go to bed we aim more or less successfully to exclude stimuli of all sorts and we welcome the ensuing lapse through reverie to unconsciousness. But when it is our purpose to concentrate the attention we avoid absolute comfort. We do not resort to a hammock or a morris-chair. Hill affirms that when we have neutralized draughts and secured a mild, uniform temperature we have shut out possible promoters of nervous activity. He would therefore prefer that ventilating and heating systems should not work too well. A touch of chilliness and a perceptible air current he would regard as desirable. Certainly it is worth while to consider that the most comfortable climates do not produce the dominant races and we have perhaps pampered ourselves unwisely by approximating such climates in our homes.

There is a corollary to Hill's contention which might not be foreseen. It is that low diet makes people seek the lifeless air of ill-ventilated houses. They cannot meet the demands of more bracing conditions because they have no fuel to spare. The case of the Newfoundland fishermen is cited: they are so underfed that they huddle in warm cabins and the hardening effect of their laborious occupation is more than counteracted by the relaxation under shelter. They are dying at an appalling rate from tuberculosis. Here, then, we have a fresh protest against the doctrines of Chittenden. Hill maintains that colder rooms with air in motion will make us more hardy and alert, but that liberal feeding must be maintained to meet the tax upon the heat-producing tissues.

Percy G. Stiles.

PUBLIC HEALTH NOTES.

The Histological Lesion of Pertussis.

The recent investigation of this subject by E. B. Mallory, M. D., and A. A. Horner, M. D., is presented in the November number of the *Journal of Medical Research.* The work was based on the microscopic study of the trachea and lungs from three patients dying of whooping cough in the Boston City Hospital (South Department).

The lesion is characterized by the presence of large numbers of minute bacilli between the cilia of the cells lining the trachea, with a varying amount of apparent erosion of the cilia themselves, only stubs remaining in places. The same conditions are present, probably less frequently and consistently, in the bronchi and bronchioles.

The organism suggests strongly the bacillus obtained in pure culture in 1906, by Bordet and Gengou, which organism is generally accepted as the cause of whooping cough. It is gram negative and stains but lightly by ordinary methods. The reaction to the organism is slight, there being no necrosis of the cells, and no increased mucous. There is, however, a migration of polymorpho nuclear leucocytes to the region, with occasionally actively phagocytic endothelial leucocytes, while the submucosa shows a moderate infiltration with lymphocytes and plasma cells.

Although there must be the production of a mild toxin, as is shown by the leucocyte migration, by lymphatic proliferation in the nodes, by the general lymphocytosis, and by the production of an antibody which acts specifically toward the bacillus, yet Mallory and Horner conclude that "the action of the bacilli in the respiratory tract would seem to be largely mechanical. By their presence in such large numbers, dozens to a hundred or more between the cilia of a single cell, they must interfere seriously with the normal ciliary action and thus with the removal of secretion and of inhaled particles in consequence of which the lungs must be more exposed to infection by inhalation than under ordinary circumstances.

"The mechanical interference with the action of the cilia, and possibly their destruction, prevent the normal removal of secretion. The bacilli and the secretion produce a continuous irritation which results in coughing, and usually also in the characteristic spasm known as whooping."

Industrial Hygiene.

"It goes without saying that of all the matters dealt with at the recent International Congress on Hygiene and Demography, none is of more concern to the medical profession and to the public, than that of diseases of occupation. It seems that nowadays the acme of civilization is considered to be reached by the country which is most given over to manufacturing. As this country is in the van of civilization, so she is almost the most prominent in manufacturing. Although industrialism produces wealth, it does not produce health. In fact, as regards the worker it is an open question whether it produces either of these desirable possessions. With respect to health, it may be emphatically stated that industrialism is its greatest enemy. It draws people from the country to the cities where they too frequently live herded together like animals and under unsanitary conditions generally. The final result is degeneration and the production of a race inherently unhealthy."

The Dietetic and Hygienic Gazette, November, 1912.

Social Conditions in Montreal.

That Montreal is, from the standpoint of public welfare, a decidedly backward city, is the conclusion one must reach after reading an account of the Montreal Child Welfare Exhibition, described by Anna Louise Strong and Rufus D. Smith in the *Survey* for November 16. The health section of the exhibit dealt especially with infant mortality and its causes, and brought out the fact that Montreal has the highest rate of any of the North American cities—250 per thousand births—this being not scientifically accurate, however, due to the lack of compulsory birth registration. The housing problem is a real one, owing to the presence of rear court houses, buildings sometimes standing three deep on a lot. "The density of population per park space is greater than any large city on the continent, greater even than that of crowded New York." The education question is also serious. There is no compulsory education, no school census, no free library; until just recently, no medical school inspection, and according to these writers, not even a complete list of the public schools in Montreal.

An investigation of several hundred employees brought out the fact that one third of them began work before the age of fourteen, so that the child-labor problem is also present in this northern city. The article further states that Montreal is without means for dealing with deficient children in the schools, and without accommodations for her mental defectives.

It is hoped that by exhibits and other educational measures there may be developed a public opinion strong enough along social lines to prevent or eradicate many of these social defects.

Gross Pathology of Rat Plague.

The gross lesions of rat plague, more fully described in *Public Health Reports* for July 26, 1912, may be indicated in the following way:

I. *Subcutaneous Injection.*

An engorgement of the subcutaneous blood vessels with a diffuse pinkish hyperæmia of the subcutaneous muscles, may be universal, bilateral, unilateral, or only about the primary bubo.

II. *The Bubo.*

May be auxillary, inguinal, pelvic or cervical. Gland varies in size, feels indurated and circumscribed upon palpation, but is caseous and easily shelled out upon dissection.

III. *Liver.*

Is yellowish in color, and studded with an enormous number of yellowish white granules, about the size of a pin head.

IV. *Spleen.*

Markedly enlarged, firm, friable, dark in color, occasionally presents small granules under the capsule, giving mottled appearance. May be slate colored.

V. *Pleura.*

An effusion, bilateral, usually serous, occasionally haemorrhagic.

Notification in Zurich, Switzerland.

A new enactment regarding infectious disease notification in Zurich is described in *Public Health* for October. Notifiable diseases are divided into two classes. Diseases under class A are smallpox, cholera, typhus, plague, epidemic meningitis and leprosy. These diseases must be reported by the head of the family if the doctor is not in attendance, and must be isolated in a fever hospital. Class B includes typhoid, food poisoning, measles, scarlet fever, diphtheria, open tuberculosis, diarrhœa, varicella, pertussis, puerperal fever, anthrax and glanders. These must be removed to a hospital when there is insufficient opportunity for isolation at home.

There are special regulations regarding tuberculosis. The disease is notifiable (a) when the case is in undoubted danger to the surroundings; (b) when there is a change of address of persons liable to notification; (c) in case of death from open tuberculosis.

Disinfection is obligatory in smallpox, cholera, typhus, plague, meningitis, typhoid, diphtheria, scarlet fever, diarrhœa, leprosy, or open tuberculosis. It may be carried out at the request of the health officer, or physician in whooping cough, anthrax and glanders.

A Health Survey.

Before the recent meeting of the Academy of Political Science, Dr. George T. Palmer recounted his experience in conducting a sanitary and health survey in the city of Springfield, Ill. In this investigation of sanitary and social conditions the chief problems studied are indicated in the following outline:

A. Typhoid Fever.

While the city of Springfield had recently spent $4,000,000 for a water and sewage system, and analyses from time to time had proven the water safe, they were confronted with a typhoid mortality rate of between 40 and 50 per 100,000 population. A very thorough study of 6,000 shallow wells and 7,000 adjacent privy vaults offered a certain explanation for this rate, and by compelling property owners to put in the city water the mortality rate for the following year (1911) was brought down into the twenties.

B. Housing.

An investigation of housing conditions resulted in a marked improvement in the tenements; lack of state laws, however, made satisfactory action impossible.

C. Infant Mortality.

Efforts directed toward the obtaining of pure milk showed results in a reduction from 68 deaths from summer diarrhœa in 1909 to 41 deaths in 1911.

D. Inspection of Restaurants and Bakeries.

E. Garbage Collection and Disposal.

Besides these direct investigations, the publicity associated with the work, and the public sentiment aroused stimulated to activity many agencies working for civic betterment. The net results of this manifold effort may be summarized as follows:

1. Lowered typhoid rate,
2. Lowered infant mortality rate,
3. Detention home for children,
4. A tuberculosis association with a dispensary and visiting nurses,
5. Medical inspection of school children,
6. County care for indigent consumptives.

Doctor Palmer's general conclusions as to the significance and effectiveness of the survery are, first, it is easier to bring about public health reforms in an American municipality than to secure any other kind of civic betterment. Second, jealous as the people are of their personal liberty, they have recognized the necessity of submission to inconvenience in the interest of the health of the community. Third, a sanitary survey is an entering wedge for any other kinds of moral, social and civic betterment. Fourth, civic problems in cities of 50,000 or 60,000 population are quite as definite, if not so extensive, as in cities of larger size. Fifth, perhaps the greatest value of a survey is the awakening of the people to the necessity for a more thorough knowledge of local conditions, and the creation of an attitude of insistance upon the improvement of these conditions.

Light and Air.

The Medical Officer for October 26 presents the criticism made by Dr. A. E. Harris, health officer of Islington, Eng., on some modern types of window construction, and quoted him further, as follows:—

" 'Builders will find out by and by that people will discover, as already many have, that large windows with sliding sashes are the only efficient means for providing those two great necessities of life, good light and ventilation, without draughts, to keep the air of the house sweet and pure; and that the sliding sashes also afford far better means for regulating the supply of air than is furnished by the windows of these picturesque houses, which are better adapted for warm climates, where the people live with open windows nearly all the year round. In England, however, except in some very sheltered spots, they are not suitable.' Doctor Harris urges that light and ventilation are the two great requirements of men, women, and children, if they are to enjoy healthy lives, and that high gabled roofs, artistic dormers, French windows, and walls covered with beautiful creepers, cannot compensate for the lack of these necessities."

School of Eugenics.

"A school which aims to give to the teacher, the parent and the social worker a practical groundwork in eugenics has been opened in Boston," says the *Survey* for November 19. "The school is an outgrowth of lecture courses which have been offered in various parts of New England during the last five years.

Courses are offered in eugenics, euthenics, biology of nutrition and reproduction, genealogy, and sex in religion. The general purpose of the school, headquarters of which are at 585 Boylston St., are stated to be, "to remove the ignorance and superstition which at present shrouds the subject of sex and reproduction, to dignify the function of parenthood in the estimation of both men and women, and to warn against race poisons and false traditions and practices which have come about by ignorance of nature's laws governing the function of race production."

Summer Resorts.

The sanitary inspection of summer resorts is an important measure from the standpoint, first, of the health of persons living in these places while on vacations; second, of the possibility of contamination from these resorts, of water supplies for other communities; and third, of the amount of disease acquired while away from home, which may be brought back to the cities by vacationists. The *Bulletin* (August) of the Ohio State Board of Health announces that the summer resorts of that state will, from now on, be subject to a sanitary survey, and comments further, as follows:—

"The importance of this work is, of course, very evident. Probably more cases of disease are acquired by individuals going away for summer vacations to resorts than are acquired at home. Many of these resorts are absolutely insanitary as has been shown by the investigations which have progressed to date. It is hoped that all health officials in the state will inform the secretary of the State Board of Health of any resorts in their immediate neighborhood, in order that this survey may be as complete as possible."

Welfare Work for Children.

Nature, through the maternal instinct, provides the animal with the ability to so protect its young that a fair percentage will usually survive. Human babies, however, in the opinion of Warfield Webb, as expressed in the December number of *Life and Health*, are too sacred to be reared on this basis. Human beings exist in a society and the social nature of human life should create an attitude of community responsibility, the result of which should be the education and protection of the mother not possessing the knowledge required in safeguarding the lives of her children. Many infants now die of preventable diseases, the result of ignorance, poverty, ill-health, insanitary environment, and other agencies, and the responsibility for this condition of affairs rests not only on the parents, but to an even greater degree, on the community. So far as society has come to recognize its obligation, there have come into being organizations of many types, attacking various phases of the evil. One such agency which attempts to give not only guidance to the mother, but the advantage of the doctor's and the nurse's assistance and training, is the day nursery. Here the infant is given care more beneficial than it could receive at home. Frequent examinations lead to the remedy of correctible defects, and the mother is taught how properly to feed, bath, exercise and provide for the sleep of the infant. Such measures may not attack the fundamental causes of infant morbidity and mortality, but in our present economic condition they are surely desirable and necessary ameliorating agencies.

How to Poison Rats.

In the *U. S. Public Health Report* for August 9, 1912, Assistant Surgeon-General Rucker, gave the following directions for the poisioning of rats, on a propholactic measure against bubonic plague:

"Get a loaf of stale bread, cut it into pieces about one inch square by three-quarters of an inch thick. Get a good rat poison. There are two chief kinds of rat poison on the market, one containing arsenic and the other phosphorus. You can tell phosphorus paste because it smells like a match head. Either one of these poisons is good, as it shines at night, and the rats like its odor and taste. A small quantity will kill them, and as it acts rather slowly, they go outside the house to die. If the poison used is too hard to spread easily on the bread, set the container is some hot water. Some pastes are thin enough so that this is unnecessary. Do not get any of the paste on your hands because it may burn the skin, and unless the hands are very carefully washed, the poison may be carried to the mouth by the fingers soiled with it. It is best to wear a pair of leather or rubber gloves when preparing the poison. Spread the poison on the pieces of bread with a knife. Be careful that all sides of the pieces are smeared with the poison. As fast as poisoned pieces of bread are prepared they should be put in a covered bucket, and when a sufficient quantity is ready, it should be distributed. Bear in mind that arsenic poison has the disadvantage that it does not deteriorate, and therefore it may be taken by some animal which it is not intended to poison a long time after it has been put out; also bear in mind that phosphorus is liable to spontaneous combustion, especially when put in a warm place or exposed to the direct rays of the sun. Phosphorus pastes which have glucose as a base are less liable to spontaneous combustion. Do not put the poisoned pieces of bread in the open because they may be taken by children or domestic animals, but put them in the rat holes where they cannot be gotten at by human beings or domestic animals. Then this is not practicable, get a small box and put small pieces of poisoned bread in a bowl, cover the bowl with the box, and bore a hole two inches in diameter in each end of the box. These holes are big enough to admit the rats and will keep out cats, dogs, and chickens. Keep track of every piece of poison put out; then after it has been out long enough you can collect the pieces of poison which remain untouched.

"Rats will not take poison in places where there is plenty of other food. Therefore to be most successful in rat poisoning the premises should be thoroughly cleaned and all foodstuffs protected from rats by the use of metal screening or metal containers. Garbage should be placed in water-tight metal garbage cans only. A starved rat takes poison quite readily."

Midwifery in Rural Districts.

An intensive investigation of this subject in Anne Arundel County, Md., by Dr. Mary Sherwood, is reported in the September number of the *Johns Hopkins Hospital Bulletin.* It was the first investigation of this kind to be conducted outside. of the large cities, being carried out, in this study, in the rural districts, where the means of transportation are entirely by horse. It was found that of 119 midwives practicing in the county, 14 per cent. were American, 79 per cent. were colored, and 7 per cent. were foreigners. Two fifths of all the births are attended by midwives, while of the 119 only four had received any school training. The fees received average from $3 to $5. Although it is forbidden by law, practically all made vaginal examinations, and while a few professed to washing their hands with soap and water, many go unwashed directly from field labor to an obstetrical case. Only two midwives were suspected of criminal practice. None of them count the pulse, although one colored midwife stated that she always felt the pulse, giving as her estimate of the normal pulse, "about two."

Many of the practices admitted to were undeniably weird and might be considered ludicrous, were they not of such serious significance. One woman's treatment of hemorrhage was to burn a cloth in a stove; another gave her patient salt to hold in her hand as the treatment for delayed placenta; in another neighborhood *ante partum* douches were routine.

However, owing to the distances to be traveled, the small number of physicians and the smallness of the fees, most of the physicians, in the county agreed that midwifery was a necessary evil, and that the problem resolves itself into one of education. Further than this, the necessary training and equipment will have to be provided free by the state. In the meantime the local physician must be looked to not to solve the problem, but to palliate, as far as possible, the lamentable state of affairs, and to demand a closer supervision of the conditions existing in his community.

Doctors of Public Health.

Dr. E. B. Dresslar in the last bulletin of the U. S. Bureau of Education emphasizes the need for more doctors of public health, and according to the *Boston Transcript*

(November 14.) states his belief that "our system of paying doctors to do something for us when we are sick ought to be largely discarded for the Chinese system of paying them to keep us from getting sick." He points out the value of school inspection for children from the standpoint of the prevention of much transmittable, disease, and justifies this, and other forms of state supervision and control, on the ground of public policy. He says further: "Our chief duty lies in removing the causes which attribute to physical unsoundness and disease. As long as we herd our children in schools where they must breath impure sir, bend over unsanitary school desks, work at books when they need physical exercise, just so long shall we be paying for our own errors." We need health officers, "whose philosophy is based on the gospel of physical vigor, on the sanctity of personal purity, and the godliness of clean living; doctors of health in very truth who will be concerned with exhibiting not a long list of the physically defective and diseased, but a large list of healthy well-developed children."

Arsenic in Textiles and Wall-Papers.

In view of the fact that some countries have passed sanitary regulations prohibiting the presence of arsenic paints, varnishes, textile materials, papers, etc., some recent experiments carried out by E. L. Dove, M. D., of London, and reported in *Public Health* for August, 1912, are of interest. He examined forty-three textile materials, with thirty-four negative results, the Marsh apparatus being employed. Two cloths showed arsenic in 5 parts per million, three 2½ parts per million, and four only a very slight trace. Eighteen wall-papers were examined, ten of which were negative, two showed .0025 milligrams of arsenic to every gram of material, and six furnished but a very slight trace.

These results, are perhaps, not very surprising when we remember that arsenic, at least in traces, is present in nearly every substance. Gantier and Bernard have found it to exist normally in men and animals; it is found in the ash of many vegetables, such as peas, cabbage, lentils, etc., while the results of more recent experiments indicate that there is probably no substance not containing arsenic, at least in trace.

Universal Medical Inspection.

We wisely spend large sums of money yearly in the inspection of cows, elevators, various forms of machinery, etc. We insure our houses against fire and our lives against demise. Most of us allow the dentist to inspect our teeth at least once a year. Why would it not be wise, asks the editor of the *Ladies' Home Journal*, to go a step further in this direction and invite the doctor to be an inspector of the family and the home? For centuries the Chinese have done this, and the custom is gaining favor in Germany. To have the doctor inspect the home and the family every so often, to suggest sanitary, physical and dietary measures for improvement, in fact, "to pay the doctor to keep us well," would be, Mr. Bok considers, a genuinely preventive, and a more rational, method.

Trolley Cars in Winter.

Following a long discussion of the subject of street car ventilation, especially of that problem as it presents itself in the cold season, the first definite attitude to be taken by any representative body was recorded in the *Boston Transcript* for November 13. Before a meeting of the Public Utilities Committee of the Boston Chamber of Commerce the subject was argued out by Drs. J. Payson Clark, John R. Howes, Vincent Y. Bowditch and Walter C. Barley, and the committee finally voted in favor of open cars during the winter. It was decided that closed cars were unhealthy, that the air was germ-laden, and that a far better standard of health could be attained were the open car put into use. Doctor Howes is reported as saying that he believed that the amount of fresh air which would result would greatly benefit sick people, particularly the tuberculous, by strengthening their lungs as well as their whole constitutions. It would seem that the semi-convertible car could be used with this end in view to a much greater extent than is at present the case. Representatives of the Boston transit companies will be requested to appear before the committee very soon in order to ascertain why some such plan if practical, should be carried out.

Mental Hygiene Conference and Exhibit.

"The Mental Hygiene Movement, of which this conference and exhibit form a part, is a well-organized endeavor to reduce the alarming amount of mental impairment in the United States by making public careful statements of the causes of mental diseases, by securing earlier medical treatment, and by preventive social service with individuals threatened with mental breakdown. The movement also includes a medical survey of institutions caring for the insane in the United States for the purpose of determining the best measures to improve standards of care among the 200,000 sufferers from mental disorders."

Thus the movement is defined in the program foreword describing the great conference of mental hygienists held at the College of the City of New York, November 8 to 15. A wonderful series of conferences took place, extending over eight days, participated in by men of authority in all subjects touching this great national question, and most skillfully designed to reach special groups, such as nurses, clergymen, parents and teachers, college men, physicians, college women and the general public.

The program described the chief objects of the National Committee for Mental Hygiene in the following words:—

"To work for the conservation of mental health; to help raise the standard of care for those in danger of developing mental disorder or actually insane; to promote the study of mental disorders in all their forms and relations and to disseminate knowledge concerning their causes, treatment and prevention; to obtain from every source reliable data regarding conditions and methods of dealing with mental disorders; to enlist the aid of the Federal Government so far as may seem desirable; to coördinate existing agencies and help organize in each State in the Union an allied, but independent Society for Mental Hygiene, similar to the existing Connecticut Society for Mental Hygiene.

"The National Committee for Mental Hygiene aims to serve as a clearing-house for the nation on the subject of mental health, the prevention of nervous and mental disorders, the care and treatment of the insane; and aims also to serve as a coördinating agency for all State and local agencies interested in these problems."

Vol. II JANUARY, 1912 No. 1

American Journal of Public Health

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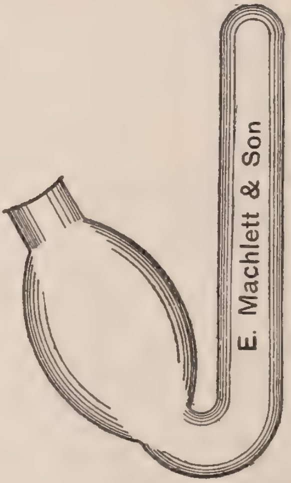

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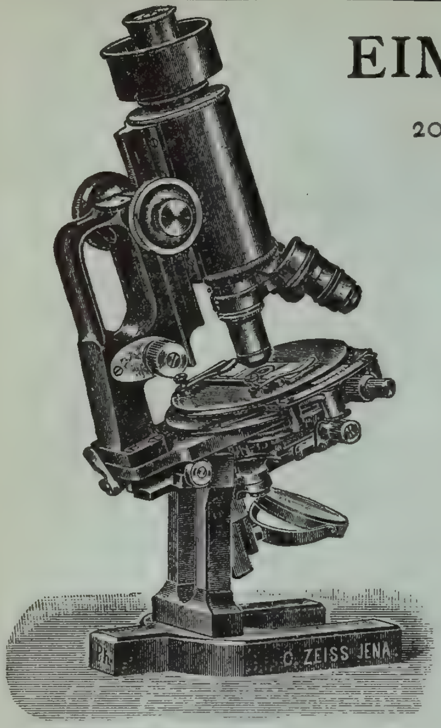

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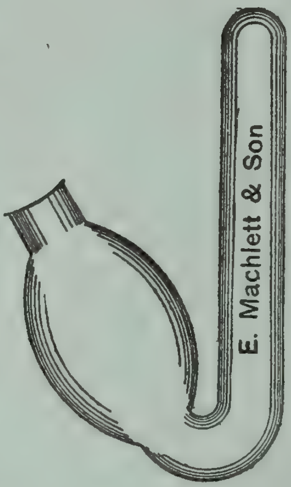

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